The Paper Industry

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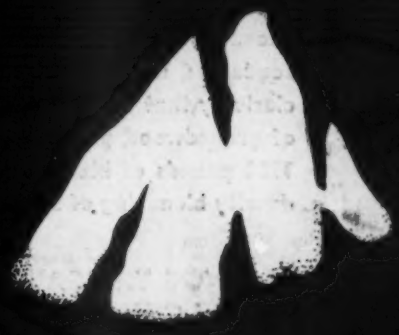
FEB 2 1953
DETROIT

STABILIZED *Sodium Aluminate*



100% Soluble
100% Stable • 100% Available

NALCO 680 is *completely* soluble, *completely* stable... the one sodium aluminate that remains in solution as sodium aluminate and does not settle out.

Every ounce of Nalco 680 provides active alkaline alumina... always available for rapid reaction. That means reduced alum requirements, lower acidity, better sizing, better retention, and therefore, better products.

Read the results reported at right—then ask a Nalco Representative to show you how Nalco 680 can repeat them in your mill.

BOX BOARD MILL—Power Savings

"Machine tenders report much better sheet formation with Nalco 680, and that jordans can be cut back 10 amps. Machines are cleaner with no deposits on cylinders."

KRAFT MILL—Alumina Retention

"Improvement in sizing, better retention of alumina, and general texture of the sheet using Nalco 680 are very marked. Converter reports the sheet handles better."

SULFITE BOND MILL—45% Less Alum

"Results using Nalco 680 at the rate of five pounds per ton have been good. Improved sizing and reduced alum from 250 to 140 pounds per 4500 pounds of furnish. This enabled the mill to meet rigid pH specifications for the paper."

TISSUE MILL—Clean Machines

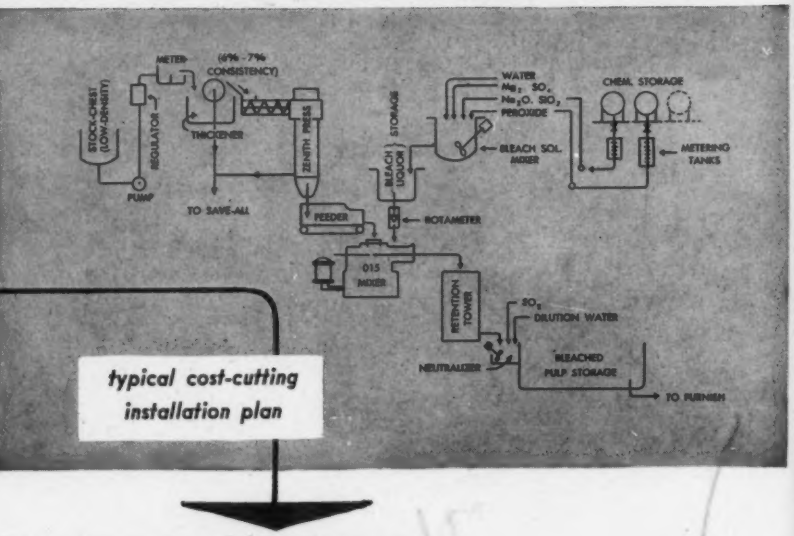
"No. 6 paper machine remaining clean and generally good results through the use of Nalco 680 applied at the rate of four pounds per ton."

NATIONAL ALUMINATE CORPORATION
6232 W. 66th Place • Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario

Nalco

...Serving the Paper Industry through Practical Applied Science

Jackson and Church — HIGH DENSITY SYSTEM



typical cost-cutting installation plan

INCREASE BRIGHTNESS . . . DECREASE COSTS!

Recently, exhaustive tests using the J-C High Density System were conducted under actual mill conditions. These tests proved conclusively that the J-C System saves 12.8 pounds of bleach per ton of groundwood pulp. For a 150 ton plant this means a saving of 1920 pounds of bleach in one day's operation! Benefits from high density bleaching of sulphite pulp are even greater.

A TYPICAL RECORD OF THE SAVINGS REALIZED FROM THE J-C HIGH DENSITY SYSTEM

From the graph it will be found that at 5% consistency the points brightness increase per point of peroxide is 0.265; and at 40% consistency it is 0.393.

For ten points brightness increase, there will be required, per ton of pulp

@ 5% $-\frac{10}{.265} = 38.7$ lbs. H_2O_2 per ton

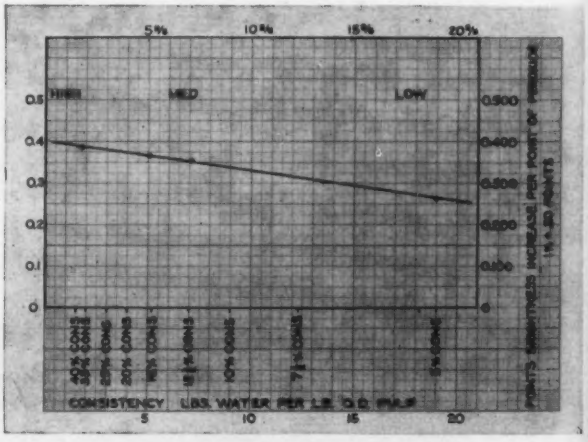
@ 40% $-\frac{10}{.393} = 25.4$ lbs. H_2O_2 per ton

Saving = 13.3 lbs. H_2O_2 per ton of pulp

Thus for a production of 150 tons per day, assuming 350 working days in the year and a cost of $28\frac{1}{2}$c per lb. for H_2O_2:

(Saving) 13.3 x $0.285 x 150 x 350 = $200,000.

The J-C Zenith Press and J-C Mixer are especially designed for use in handling the high consistencies possible with the Jackson & Church High Density System.



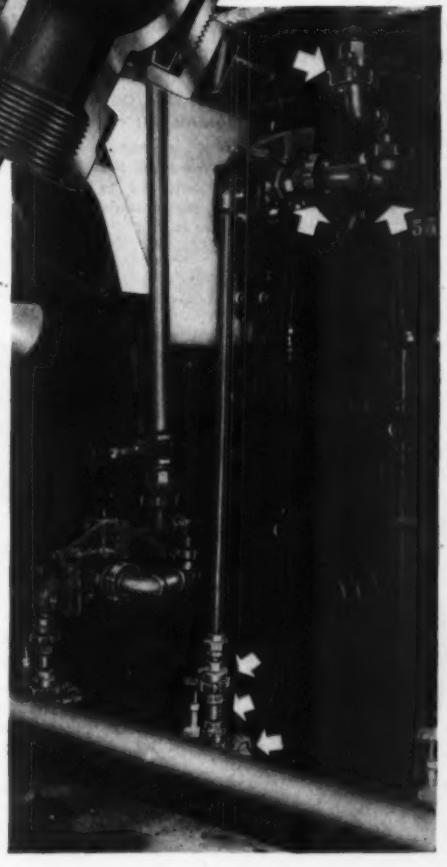
Our engineering department is available for cost analysis

JACKSON & CHURCH COMPANY • SAGINAW, MICHIGAN

NOW! A Better Piping Hook-Up for Paper Machines

BARCO *Flexible* **BALL JOINTS**

"MOVES IN ANY DIRECTION"



THESE pictures show how a number of paper mills and leading machine builders are now using Barco Ball Joints to make trouble-free *flexible* piping connections to dryers.

OVERCOMES "CONNECTOR FAILURES"—Failures experienced in other flexible connectors have been traced to a characteristic *"double twisting"* action set up by expansion and contraction in long steam supply and condensate return headers.

ACCOMMODATES ALL MOVEMENT—Barco Ball Joints readily accommodate movement in any direction, *including swivel action.* Used in combination with standard iron pipe, they provide leakproof flexible connections for steam and condensate lines that are practically indestructible.

AVAILABLE NOW—Barco engineers and representatives are ready with recommendations for hook-ups and joints to meet your particular needs. *Call or write today!*

BARCO *Manufacturing Co.*

1826B Winnemac Ave., Chicago 40, Illinois • *In Canada:* The Holden Co., Ltd., Montreal

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

Only flat leather belting can really handle all these drives

For more production-power use G&K Leather Belting

Machine builders and operators depend upon flat leather belting to absorb starting torque and load shock . . . to transmit maximum, uniform horsepower at sustained RPM . . . to drive several pulleys simultaneously.

Graton & Knight Flat Leather Belting is ready to provide *more* production-power on *your* drives. Here are three famous brands . . . quality-controlled from green hide to finished belting:

HEART OAK top grade center stock oak tannage for tough conditions . . . cross, shifter and idler drives.

RESEARCH® premium quality special tannage for short-center, small pulley, cone pulley and serpentine *precision* drives.

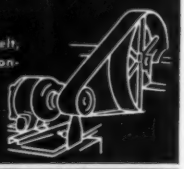
SPARTAN® combination tannage . . . for all drives exposed to steam, oil, water, acid and alkali fumes.

FREE BELTING CATALOG AND MANUAL 101

Forty pages of information covers flat, V, round and link belting . . . tells how to specify, install and maintain belting. It's free to you.

Controlled Tension Motor Base

Only a flat leather belt, made endless, has controlled elasticity and high friction needed to grip pulleys and deliver full power.

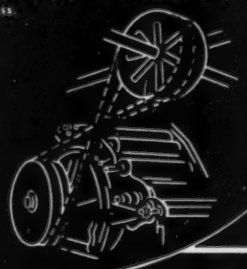


Straight Open Drive

Runs at any angle. Only flat leather belting has the strength with resiliency needed for full power and long life.

Cross Drive

Flat leather belting resists wear, gives best pulley grip, and is easily made endless.



Cone Pulley Drive

A flat leather belt, engineered correctly, makes full contact with each cone pulley.

Multiple Pulley Drives

Only flat leather belting has the flexibility and high friction surface on each side needed for these "serpentine" drives.

Quarter-Turn Idler Drives

Small idler pulleys, and continuous flexing and twisting, will usually tear the heart out of anything but a good leather belt!

GRAKO® Sprazon

***ORIGINAL* BELT DRESSING IN A SPRAY CONTAINER**

Spray your belts to keep them pulling for you. Famous liquid GRAKO Belt Dressing made by men who know belting best, stops slipping instantly. Safe, easy and economical for leather, rubber, fabric . . . flat, round and V-belt drives. Also supplied in pint, quart and gallon cans, 5-gal. and 50-gal. drums. See your Industrial Supplies Distributor. Send for folder.

Graton & Knight Company

WORCESTER 4, MASSACHUSETTS

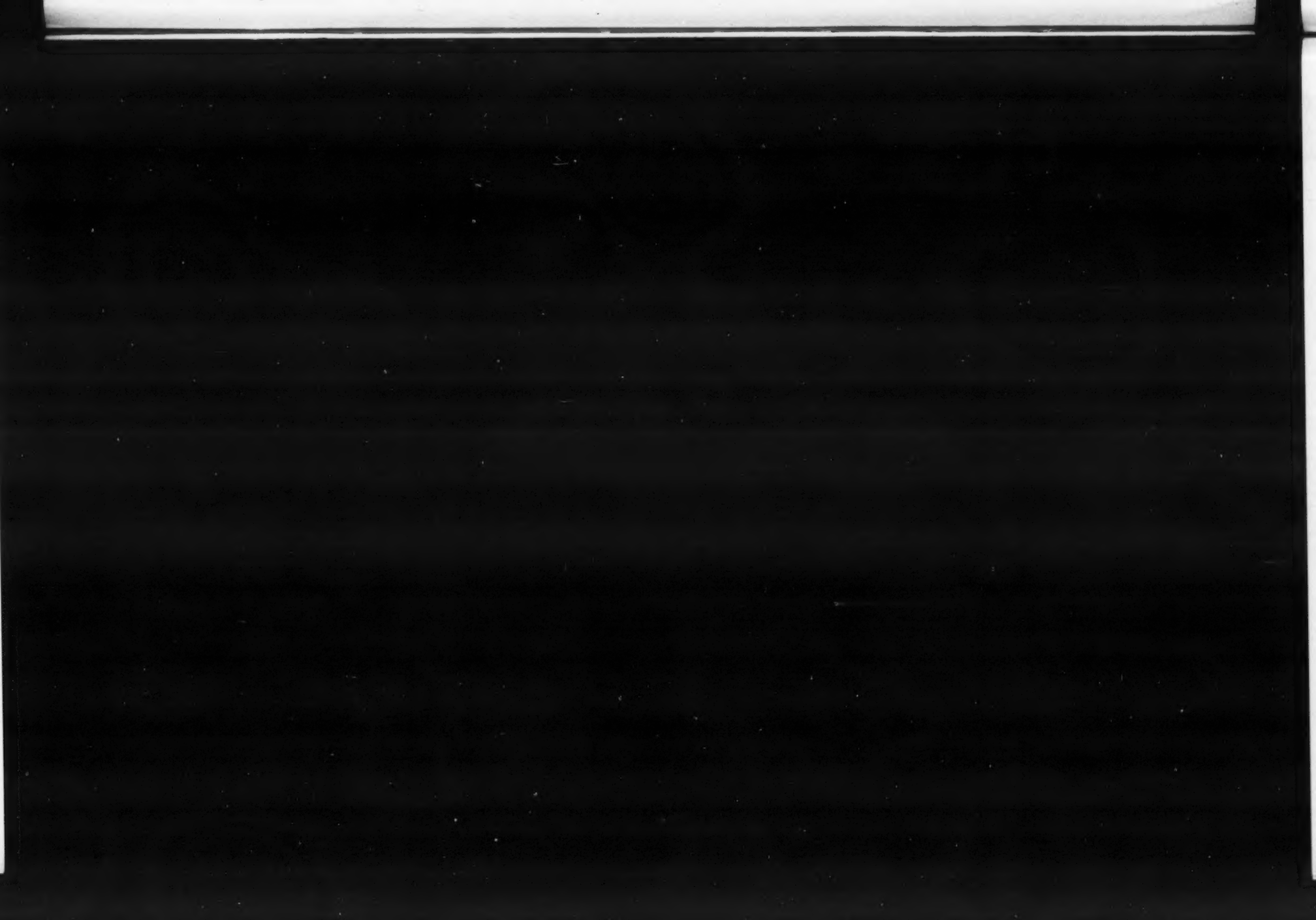
GRATON AND KNIGHT

Estab. 1851

World's Largest Manufacturer of Industrial Leather Products

***Also* . . . round, link and V belting, belt lacing, dressings, cements, specialty leathers. Packings—Leather and Rubber. Textile Leathers.**

B-1



The Paper Industry

Technology • Engineering • Management • Production

VOLUME 34 • NUMBER 10 • JANUARY, 1953

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Quality Paper Making calls for OK BRAND STARCHES

for tub, beater and calender sizing— for coating and adhesives

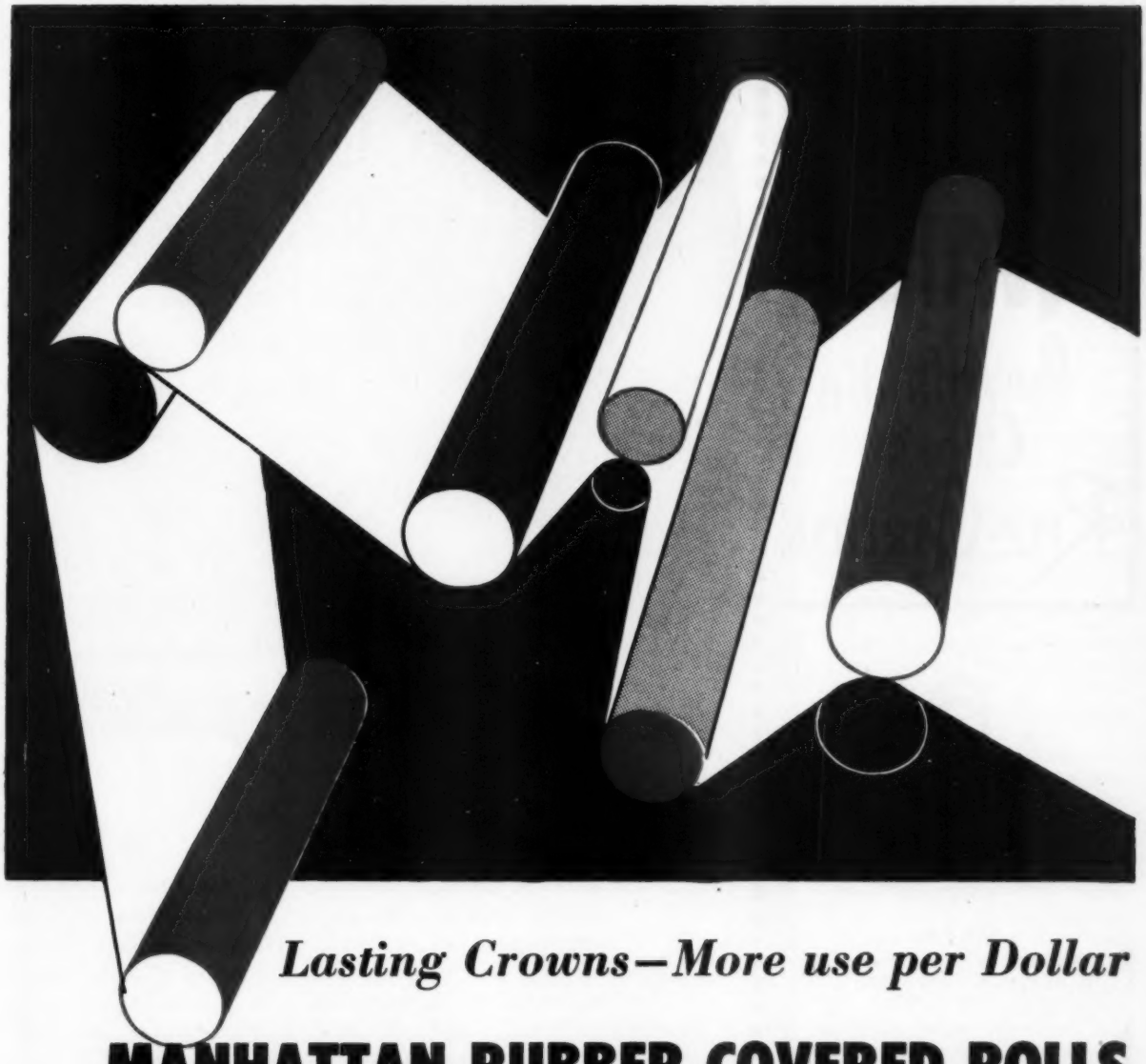
FREE TECHNICAL SERVICE!

Some of the industry's outstanding experts in the use of starch in paper making are on the staff of Hubinger's famous laboratories. You are invited to consult these experts on your production problems—without cost or obligation on your part.

...the Stamp of Quality!

THE HUBINGER CO. (EST. 1881), KEOKUK, IOWA

Branch offices: New York • Boston • Charlotte • Chicago • Los Angeles



Lasting Crowns—More use per Dollar

MANHATTAN RUBBER COVERED ROLLS

You save money on rolls and lower your production costs because you get perfect and durable crowns to *your* specifications . . . Just the right density . . . Just the precise dimensions you demand. That's because Raybestos-Manhattan custom-covers roll cores to meet the special needs of your plant. Manhattan Rubber Covered Rolls hold their crowns longer and their density permanently, giving you uniform, trouble-free production. Talk it over with the R/M specialist nearest you, next time you need rolls rubber covered.

ROLL COVERING PLANTS AT PASSAIC, N. J. — NEENAH, WISC. — NORTH CHARLESTON, S. C.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

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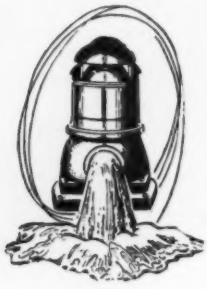
Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

WATER for Atlantic City's RITZ-CARLTON



DATA:

- —WELL; Drilled by rotary clay-seal process, 850 feet deep in the Kirkwood stratum; double cased and graveled.
- —CASING; 145 feet of 16″ and 747 feet of 12″ steel.
- —SCREEN; 61 feet of 6-guage Armco Iron.
- —PUMPS; Originally equipped with 4-stage 15″ bowls with cast iron impellers. Later replaced with 5-stage 12″ bowl and bronze impeller.
- —MOTOR; Original 25 HP electric still giving good service.

On Atlantic City's famous board walk, stands one of America's loveliest hotels—the Ritz-Carlton. Twenty-eight years ago, the owners turned to Layne for a well and pump installation. In the intervening years—over a quarter century, they have never experienced one fraction of disappointment in the dependability, durability and ever faithful performance of their purchase.

In the twenty-eight years of almost constant operation, the Layne unit has produced more than 1,471,680,000 gallons of water—all the fresh water needed by this great hotel. Upkeep expense since the day installed has averaged less than a hundred and seventy dollars a year. One amazing fact is that the original Armco iron screen is still functioning. Another is that the well was installed by a method that completely sealed off all infiltration of salt water in a most difficult salt water area. Such is the life expectancy, satisfactory operation and generally low upkeep expense of Layne wells and pumps.

For Water Well and Pump Catalogs, write to

Layne & Bowler, Inc.

GENERAL OFFICES, MEMPHIS 8, TENN.

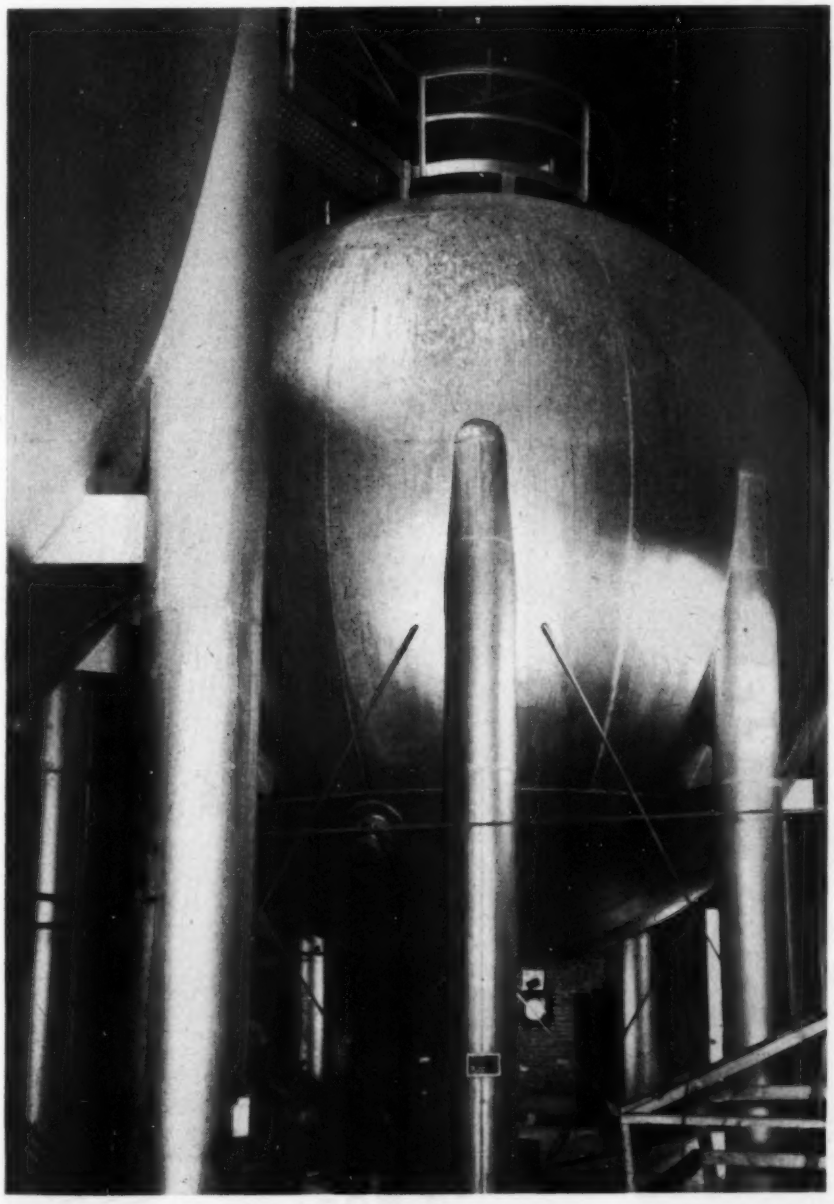
Layne

There are Layne Associate Companies located throughout the country. The one near you already understands the drilling and water bearing formations in your area.

WATER WELLS
VERTICAL TURBINE PUMPS
WATER TREATMENT

SPHERICAL ACID ACCUMULATORS

for the paper industry



The view at the left shows two spherical acid accumulators we built for the Groveton Paper Company at Groveton, New Hampshire. These accumulators are another example of the wide variety of steel plate work that we do for the paper industry.

As no two plants in an industry operate in exactly the same manner, we are equipped to do special plate work to meet your individual plant requirements. We have facilities for designing, fabricating and erecting pressure vessels. We supply clad or lined digesters, chip tanks, seal tanks, storage tanks, elevated water tanks and Marx Savealls. We have equipment for stress relieving and x-raying and recently enlarged our facilities for pickling and painting fabricated steel to remove mill scale and protect the surface of the metal.

Our plants at Birmingham, Chicago, Salt Lake City and Greenville, Pa., are strategically located to serve the pulp and paper industry. Our years of experience, skilled personnel, and up-to-date facilities are at your service. For more information, please write our nearest office.

Two spherical acid accumulators built by Chicago Bridge & Iron Company for the Groveton Paper Company, Groveton, New Hampshire.

CHICAGO BRIDGE & IRON COMPANY

Atlanta, 3 ..... 2143 Healey Building
Birmingham, 1 ..... 1511 North 50th Street
Boston, 10 ..... 1026-201 Devonshire Street
Chicago, 4 ..... 2445 McCormick Building
Cleveland, 15 ..... 2267 Midland Building
Detroit, 26 ..... 1566 Lafayette Building
Havana ..... 402 Abreu Building
Houston, 2 ..... 2143 C & I Life Building
Los Angeles, 17 ..... 1559 General Petroleum Building
New York, 6 ..... 3350—165 Broadway Building
Philadelphia, 3 ..... 1653—1700 Walnut Street Building
San Francisco, 4 ..... 1547—200 Bush Street
Seattle, 1 ..... 1327 Henry Building
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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.

In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

APPLETON FELTS

FOR

DEPENDABILITY

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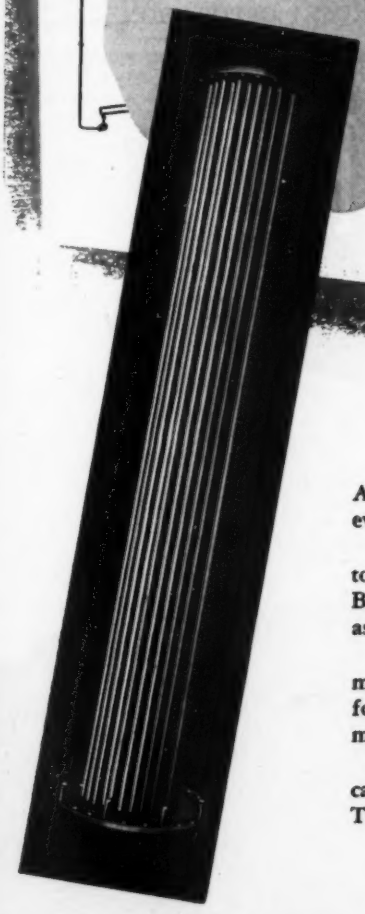
APPLETON WOOLEN MILLS

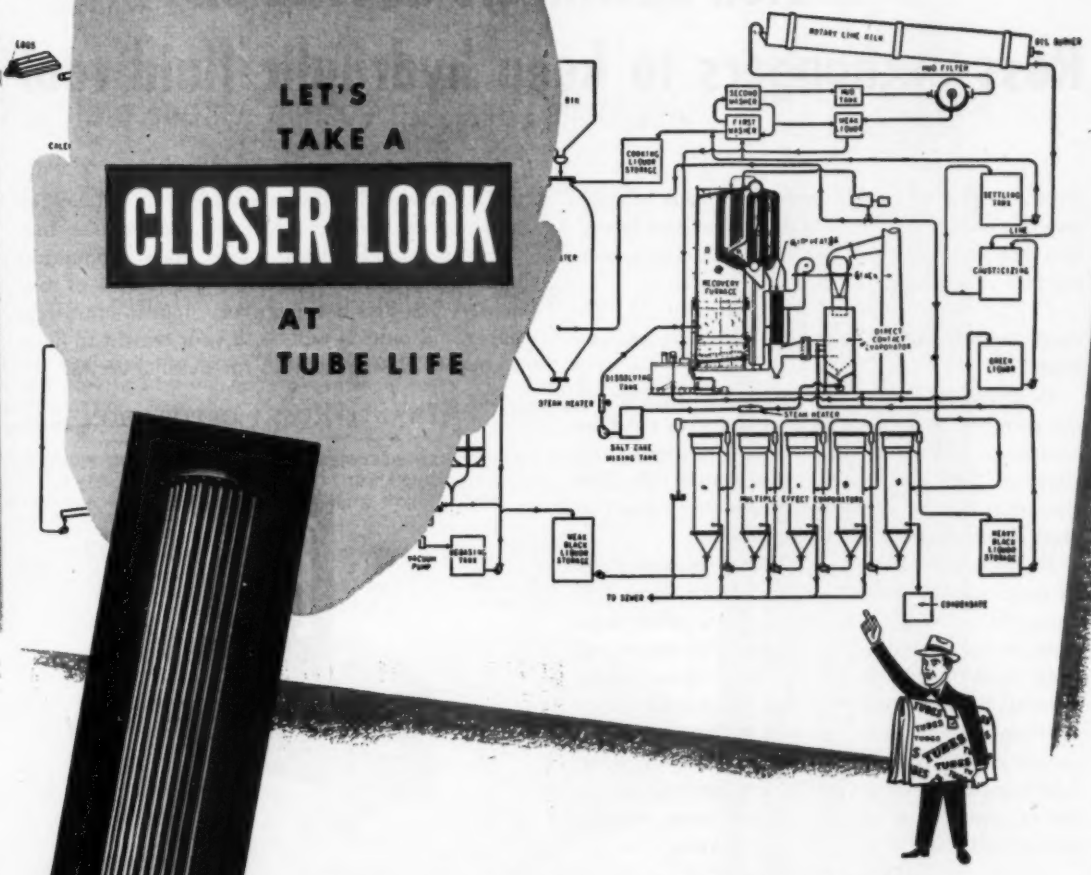
APPLETON • WISCONSIN

LET'S TAKE A

CLOSER LOOK

AT TUBE LIFE





Are you getting the optimum cost-life ratio from tubing in condensers, evaporators, heat exchangers, recovery units, and other installations?

If you are undecided as to whether you are getting too much or too little from present tubing applications, consult Mr. Tubes—your B&W Tube Representative. Chances are he can give you valuable assistance in the light of today's critical materials situation.

For example, in a given service, re-tubing with certain lower grades may give savings in initial cost without materially affecting performance; or, under different conditions, switching to a higher alloy may pay service dividends far beyond a negligible increase in cost.

Send for Bulletin TB-328 containing properties, applications, fabricating data, and other information on B&W Seamless and Welded Tubes for Pulp and Paper Mills.

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

General Offices & Plants

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

Sales Offices: **Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. Cleveland 14, Ohio • Denver 1, Colo. • Detroit 26, Mich. • Houston 2, Texas Los Angeles 17, Cal. • New York 16, N. Y. • Philadelphia 2, Pa. St. Louis 1, Mo. • San Francisco 3, Cal. • Syracuse 2, N. Y. Toronto, Ontario • Tulsa 3, Okla.**

B&W SEAMLESS and WELDED TUBES

TA-1676S

Rolling along at a 3500 ft. per minute clip

Appleton Rewinders depend on Ross exchangers to keep hydraulic fluid cool

Producing uniformly wound paper rolls of consistent density, at speeds of 3500 fpm and faster, this Appleton Rewinder utilizes hydraulic power for two of its major operating features:

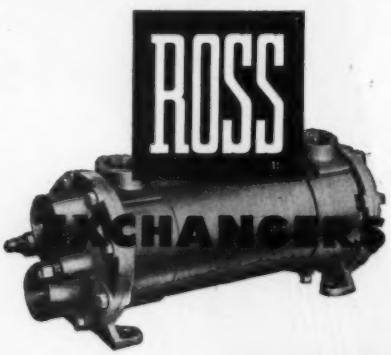
(1) To raise and lower the riding roll. (2) To eject the finished roll onto the receiving mechanism.

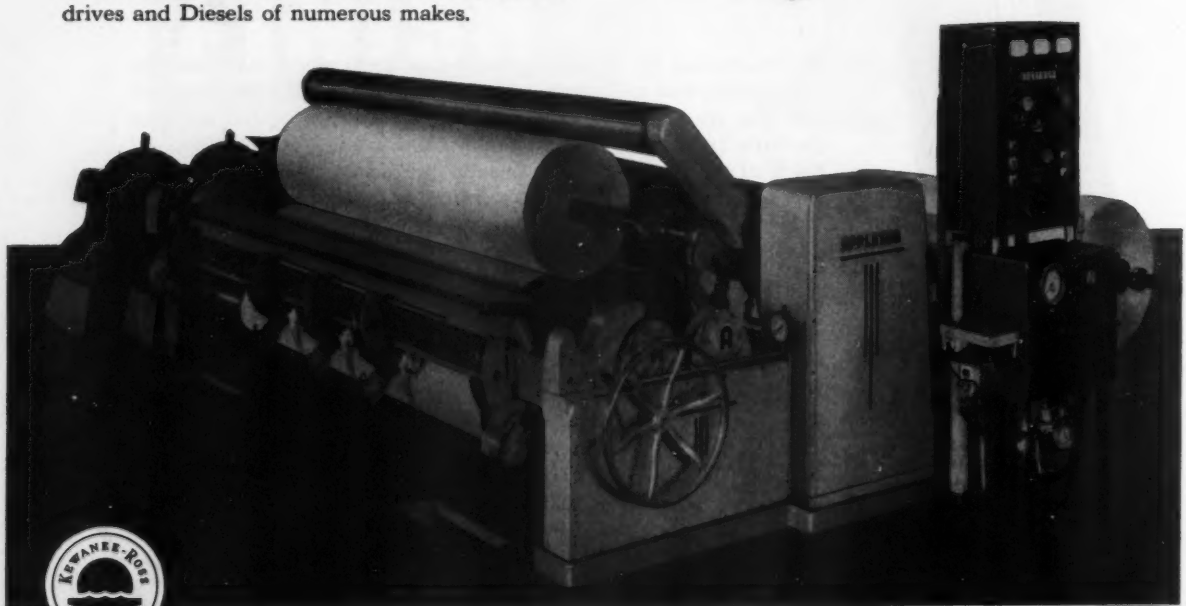
In order that these operations can be carried out properly, hydraulic oil temperatures must be constant — allowing no chance for hydraulic slippage through thinned, overheated oil! *The Appleton Machine Company furnishes a built-in Ross Exchanger for just that purpose.*

Because they have continuously proved their extreme suitability and dependability, Ross Exchangers are daily performing many other temperature-safeguarding functions in the paper and pulp field. Appleton applications alone cover several: on super, machine and embossing calenders; on pulp grinders — either for bearing lubrication or hydraulic pressure systems, or both. Likewise, Ross Exchangers have become standard equipment on paper machine dryers, turbine drives and Diesels of numerous makes.

The Ross advantages of enduring all-copper and copper alloy construction, pre-engineering, complete standardization and mass production have won the preference and confidence of machinery builders serving *every* field — not alone paper and pulp. It will be to your benefit to have a copy of Bulletin 1.1K5 for details. Write.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1430 WEST AVENUE • BUFFALO 13, N. Y.





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Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Regulate surface density precisely, effectively

KELSIZE or one of the KELGINS

Superior Surface Control Agents

These hydrophilic colloids effectively regulate surface density when applied as a 0.20% to 3.5% solution from calender stack or size press, and effectively control penetration of adhesives, starch solutions, or any water base solution.

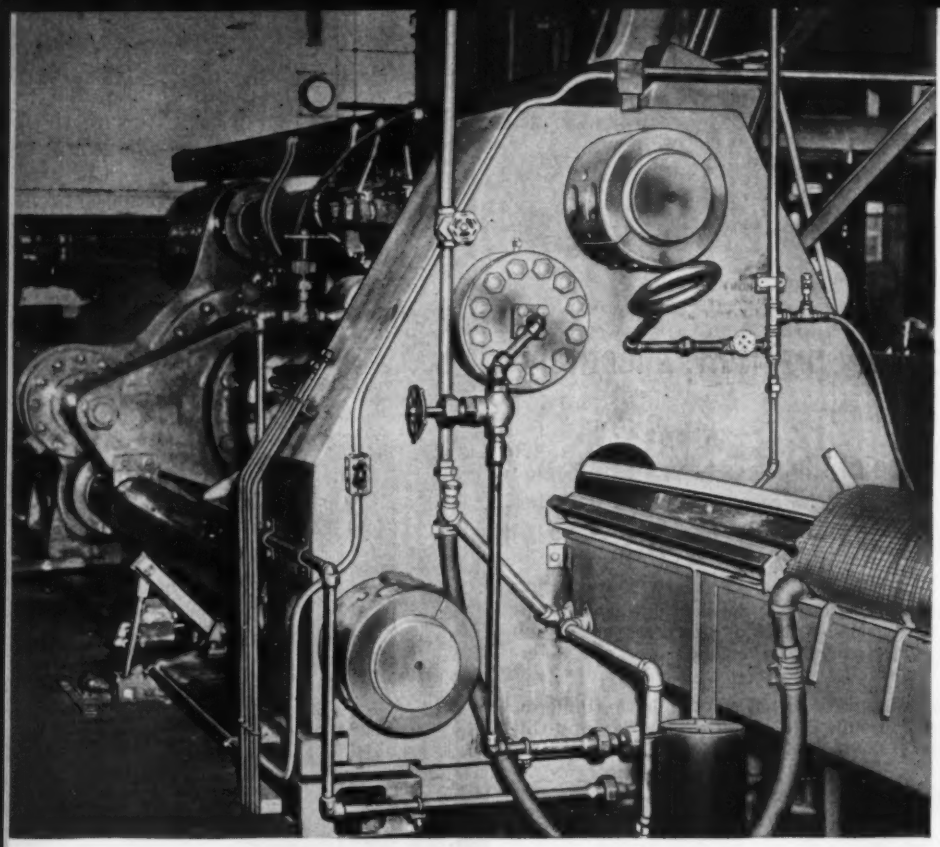
You secure these important advantages: Uniformly smooth finish—Uniform density • Improved Gloss and Flat Ink Printing • Greater Wax and Oil Resistance • Smoother and More Uniform Coating Base.

Kelsize® and Kelgin® products of KELCO company

20 N. Wacker Drive, Chicago 6, Ill. | 31 Nassau Street, New York 5, N. Y. | 530 W. Sixth Street, Los Angeles 14, Calif.

Try Kelsize or Kelgin and

Picture of Gurley Densometer • Courtesy of W. & L. E. Gurley



Puts squeeze on hydraulic press maintenance...

• Shown above is the 1250-ton hydraulic press used by the Light Metals Corporation of Grand Rapids, Michigan, for extruding variously shaped sections of aluminum. When this press was installed recently, officials gave the important hydraulic oil job to STANOIL Industrial Oil. They based that decision on their own experience with this outstanding oil.

That experience covered over four years' use of STANOIL in the hydraulic system of a 315-ton extrusion press. STANOIL has served continuously in this press without being changed or removed for oil maintenance. The hydraulic oil system has never been cleaned and has remained entirely free from deposits and varnish. Hydraulic operation has been efficient at all times.

The experience of the Light Metals Corporation is your assurance of STANOIL's ability to reduce hydraulic system maintenance to a minimum in your plant. This

STANOIL
TRADE MARK
Industrial Oil

versatile oil will provide clean, dependable lubrication for such a variety of equipment as air compressors, reduction gears, and electric motors. The Standard Oil lubrication specialists will help you make the most effective use of STANOIL. Phone him at your local Standard Oil (Indiana) office. Or write, Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

What's YOUR problem?

D. R. Clay, of Standard Oil's Grand Rapids, Michigan, office, is the lubrication specialist who has helped Light Metals Corporation keep maintenance of hydraulic units at a minimum through use of STANOIL Industrial Oil.

He is one of many Standard Oil specialists located throughout the Midwest. These men have the practical experience and special training to handle lubrication problems on any type of operation.

Take advantage of the service offered by the lubrication specialist nearest your plant. You can contact him easily by phoning your local Standard Oil Company (Indiana) office. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

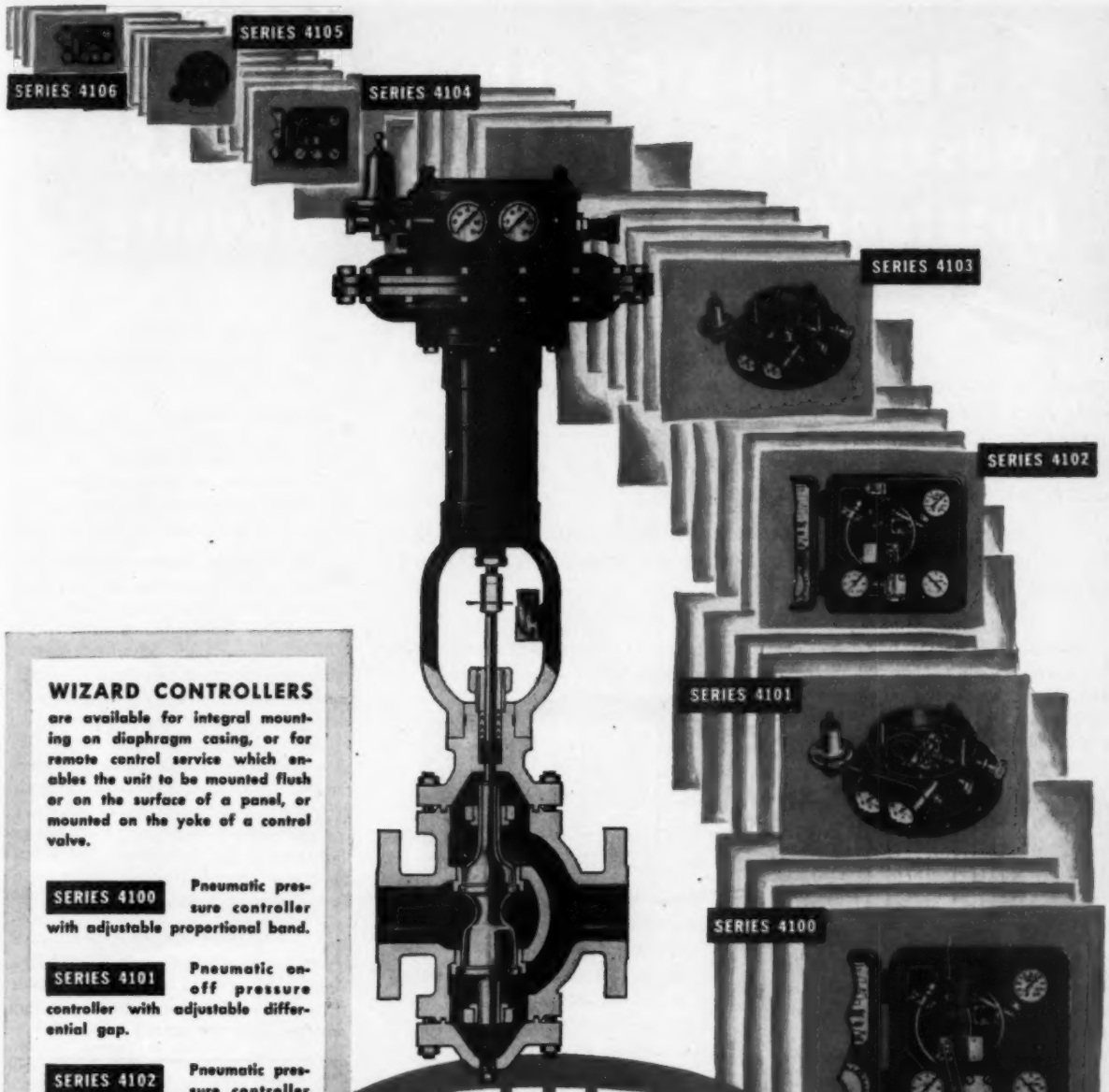
Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings... rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs.

STANDARD OIL COMPANY STANDARD *(Indiana)*



WIZARD CONTROLLERS are available for integral mounting on diaphragm casing, or for remote control service which enables the unit to be mounted flush or on the surface of a panel, or mounted on the yoke of a control valve.

SERIES 4100 Pneumatic pressure controller with adjustable proportional band.

SERIES 4101 Pneumatic on-off pressure controller with adjustable differential gap.

SERIES 4102 Pneumatic pressure controller with non-bleed orifice and low pressure cut-off.

SERIES 4103 Low pressure Wizard, bellows actuated with differential gap.

SERIES 4104 Wizard controller with differential gap and non-bleed pilot.

SERIES 4105 Bellows actuated differential pressure controller.

SERIES 4106 Low pressure, bellows actuated, Wizard pressure controller.

FISHER®

FISHER® WIZARD PRESSURE CONTROLLERS

Available in a variety of constructions for your particular requirements in the CHEMICAL PROCESS INDUSTRIES, GAS DISTRIBUTION, PIPE LINE TRANSMISSION, POWER PLANTS, REFINERIES, OIL PRODUCTION and GENERAL INDUSTRIAL APPLICATIONS.

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

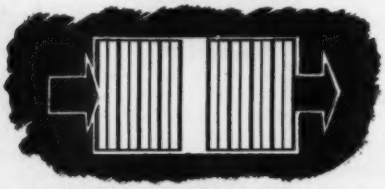
WORLD LEADER IN THE MANUFACTURE OF LIQUID LEVEL CONTROLLERS, PRESSURE REGULATORS AND IN RESEARCH FOR BETTER CONTROL

These 10 BIG Features Make Western Precipitation COTTRELLS Outstanding in the Paper Industry

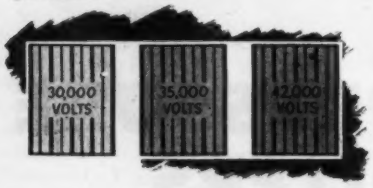
When considering COTTRELL Equipment for salt cake recovery, or any other application in the paper industry, remember this . . . *Western Precipitation Corporation not only pioneered the first commercial application of* COTTRELL *equipment made in any industry, but also pioneered the first application of* COTTRELL *equipment in the paper industry.*

Among the vitally important advantages found in Western Precipitation COTTRELLS, the following are particularly important in paper mill installations ...

1 **Sustained Year-After-Year Efficiency:** The recovery efficiency of Western Precipitation COTTRELLS does not fall off in service. All parts are of ample design to maintain guaranteed over-all efficiency year-after-year —not for just a single acceptance run.



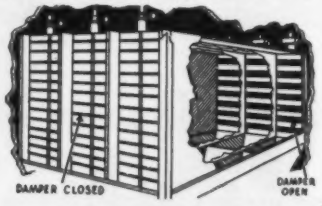
2 **Higher Recovery:** The horizontal flow design of Western Precipitation COTTRELLS eliminates collected material falling countercurrent to incoming gas stream This assures higher recovery, minimum resuspension of recovered material in gas stream.



3 **Maximum Performance:** Horizontal flow of Western Precipitation COTTRELLS permits use of multiple electrical sections so that voltage in each section can be varied to dust loading for maximum recovery without arc-over or electrical breakdowns.

4 **Lower Over-all Cost:** When comparing COTTRELL costs, be sure to compare total *installed* cost, including duct work.

5 **Simpler Maintenance:** Because all interior parts and electrode systems are readily accessible, Western Precipitation COTTRELLS are far easier to maintain and service. Saves "down" time, saves repair costs.



6 **Greater Adaptability:** Horizontal flow design permits use of multi-vane dampers in multiple-unit installations. Thus, one unit can be shut off completely to permit maintenance operations without closing down entire Precipitator. Also, the dampers can be used in slightly-closed position to assure more uniform gas distribution.
On single-unit installations, chain curtains assure uniform distribution of gases. Curtains are easily kept clean by shaker mechanisms provided.

7 **"V"-Shaped Hoppers:** Horizontal design permits use of continuous "V"-shaped hoppers for collecting recovered material. Steeply-sloped walls in this type of hopper prevent build-up or bridging of recovered material.

8 **Space-Saving Compactness:** Not only do their horizontal design permit maximum compactness in Western Precipitation COTTRELLS, but various sections of a unit can be arranged for indoor installation in space above cascade evaporators, thus utilizing space otherwise wasted.

9 **All-Weather Construction:** Western Precipitation COTTRELLS are built for both indoor or outdoor installation, and this organization has had extensive experience with special construction to prevent excessive corrosion in rigorous northern climates.

10 **More Extensive Experience:** Since pioneering the commercial application of COTTRELL Precipitators over 42 years ago, Western Precipitation has consistently led in developing one unique advancement after another. Such features as 4-Point Electrode Suspension that eliminates misalignment of electrodes and reduction in recovery efficiencies . . . Unusually Rugged Rapper Design that assures proper cleaning of electrodes . . Extensive Experience with all types of electrode designs . and many other advantages assure you the ultimate in COTTRELL design and efficiency when you bring your recovery problems to Western Precipitation engineers.

Without obligation our nearest representative will gladly make Western Precipitation COTTRELL *experience available to you for solving your particular recovery problem. Why not contact him today?*

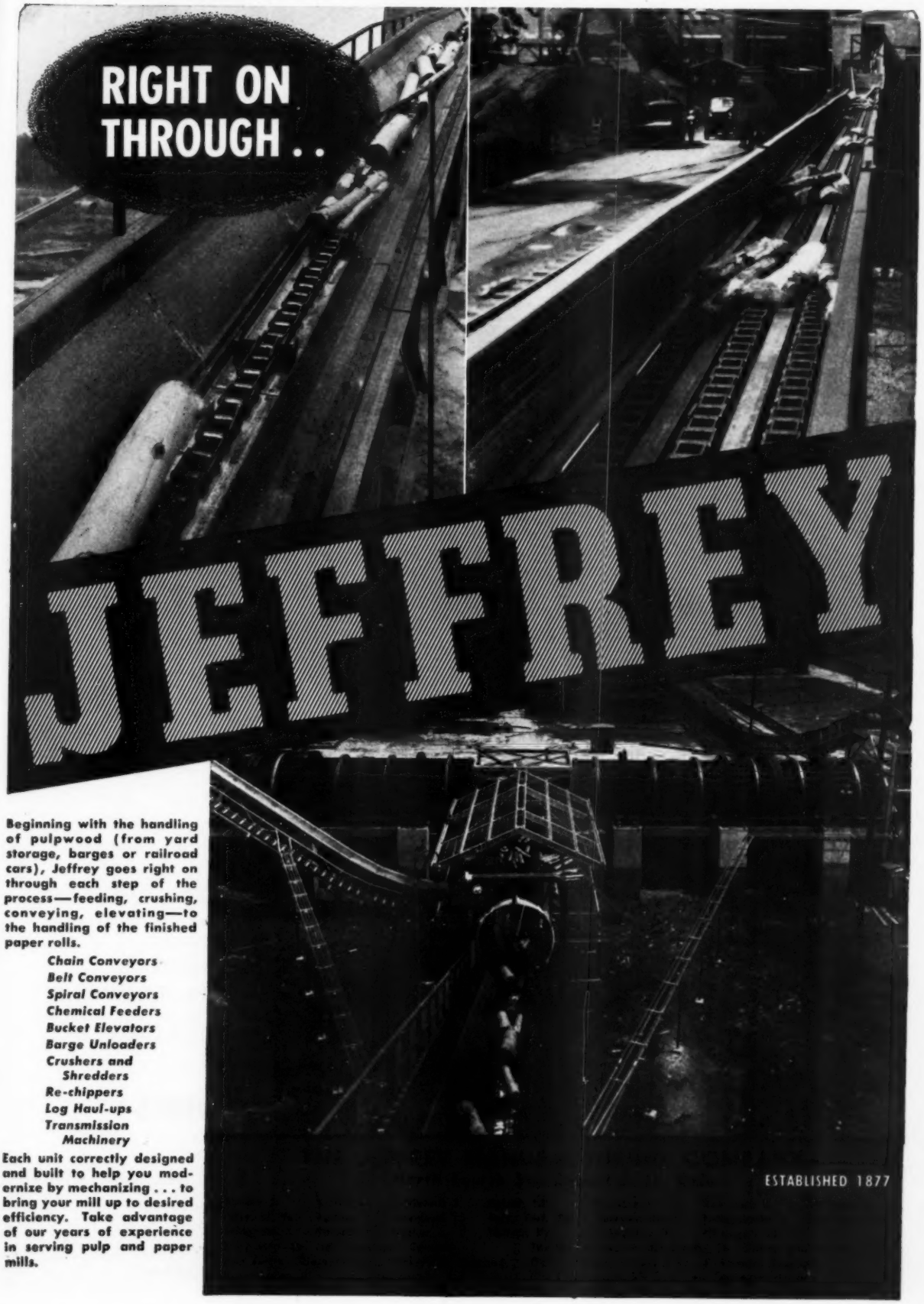
IMPORTANT! In addition to COTTRELL *Electrical* Recovery equipment, Western Precipitation Corporation also designs and installs the well-known MULTICLONE *Mechanical* Collectors for hogged-fuel fired boilers. These units are unusually compact, highly efficient and can be readily fitted into existing plants at minimum installation costs. *Write for details!*

Send for Helpful Literature

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1037 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

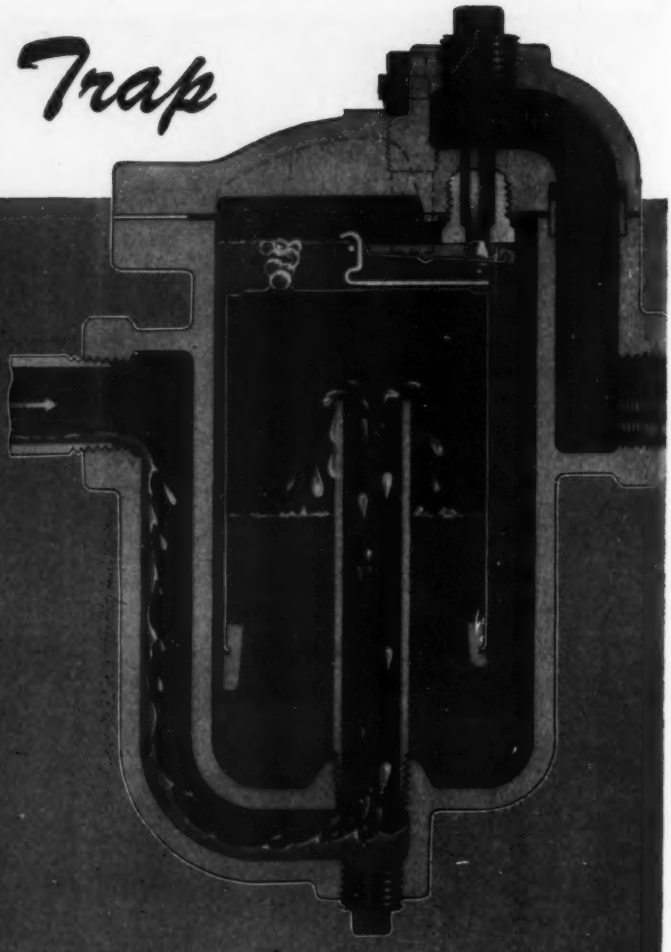


Beginning with the handling of pulpwood (from yard storage, barges or railroad cars), Jeffrey goes right on through each step of the process—feeding, crushing, conveying, elevating—to the handling of the finished paper rolls.

Chain Conveyors
Belt Conveyors
Spiral Conveyors
Chemical Feeders
Bucket Elevators
Barge Unloaders
Crushers and Shredders
Re-chippers
Log Haul-ups
Transmission Machinery

Each unit correctly designed and built to help you modernize by mechanizing . . . to bring your mill up to desired efficiency. Take advantage of our years of experience in serving pulp and paper mills.

This Steam Trap



MEETS THE REQUIREMENTS of Paper Machine Drainage

1. FAST VENTING OF AIR

2. LOW MAINTENANCE

STEAM traps haven't always worked so well for draining paper machines. First, they wouldn't vent air fast enough, so that heat-up was slow after the machine had been down. Second, they didn't wear too well.

The Armstrong No. 813D steam trap was designed to answer these objections. That it does has been proved by many mills with individual 813D traps on each dryer.

Large air venting capacity is secured with oversize bucket vents.

Long life with infrequent maintenance has been secured by:

1. An extended inlet tube which admits condensate, steam and air into the trap above the water level in the bucket. This eliminates excessive wear-producing agitation of the mechanism.

2. Chrome steel valve and seat — hardened, ground and lapped — same as used in traps for 900°F., 950 psig. All other working parts 18-8 stainless steel, heavily reinforced for wear.

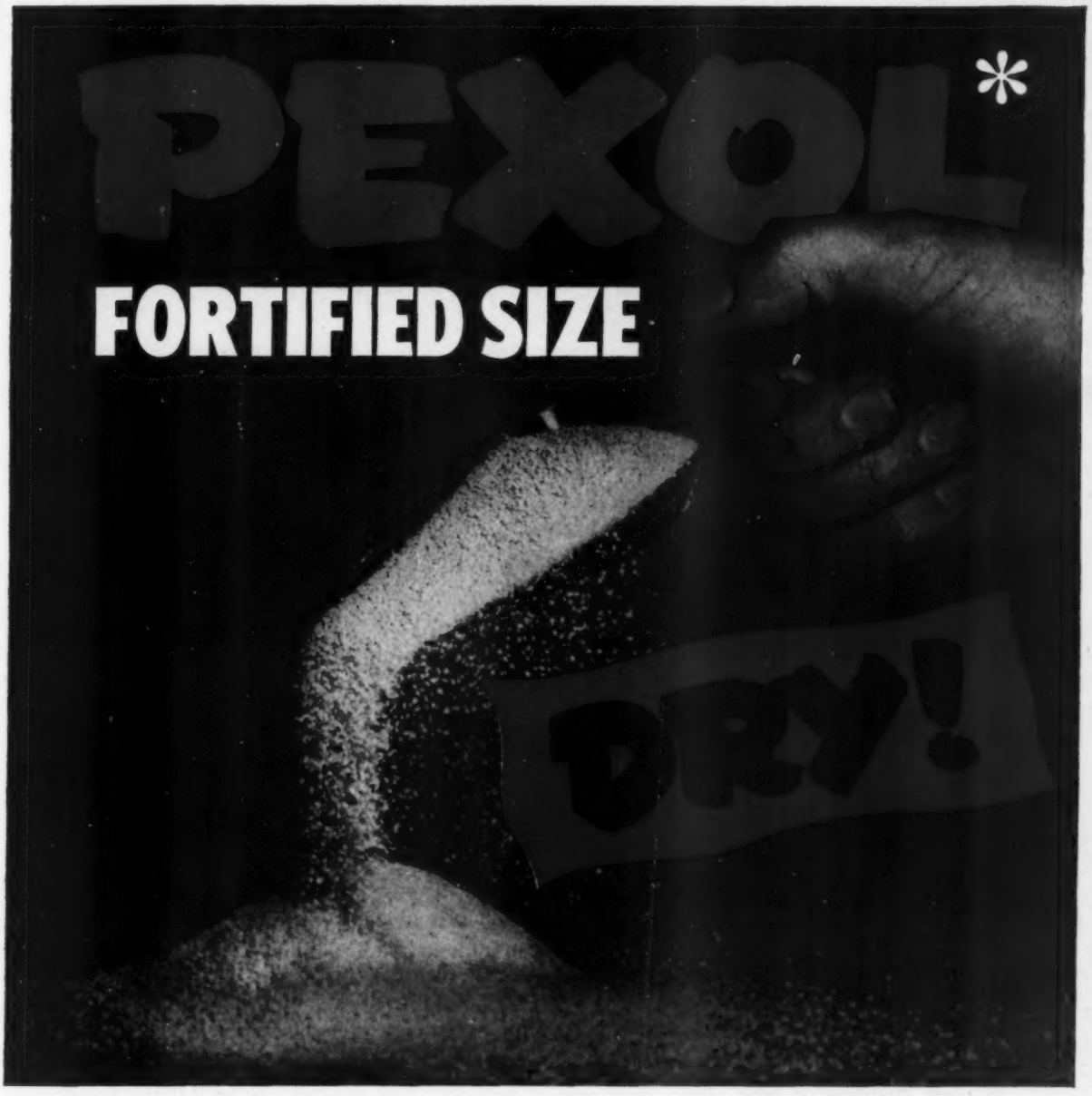
With this trap you get all the advantages of simplicity, economy, dependability and fast drainage with none of the previous disadvantages. SEND FOR BULLETIN No. 205.

ARMSTRONG MACHINE WORKS

816 Hoffman Street, Three Rivers, Michigan

ARMSTRONG

Moisture Control Systems
Individual Dryer Temperature Controls
Paper Machine Drainage Traps
Inverted Bucket Steam Traps
Steam Humidifiers



If you're set up to use dry size, and you'd like to get the many advantages of a *fortified* size, you can do so—with dry Pexol. Mills report substantially lower size cost per ton of paper and paperboard when using Pexol dry size. Similar savings are effected through use of paste Pexol.

Let us send you detailed information that will show you how dry Pexol can save you money.

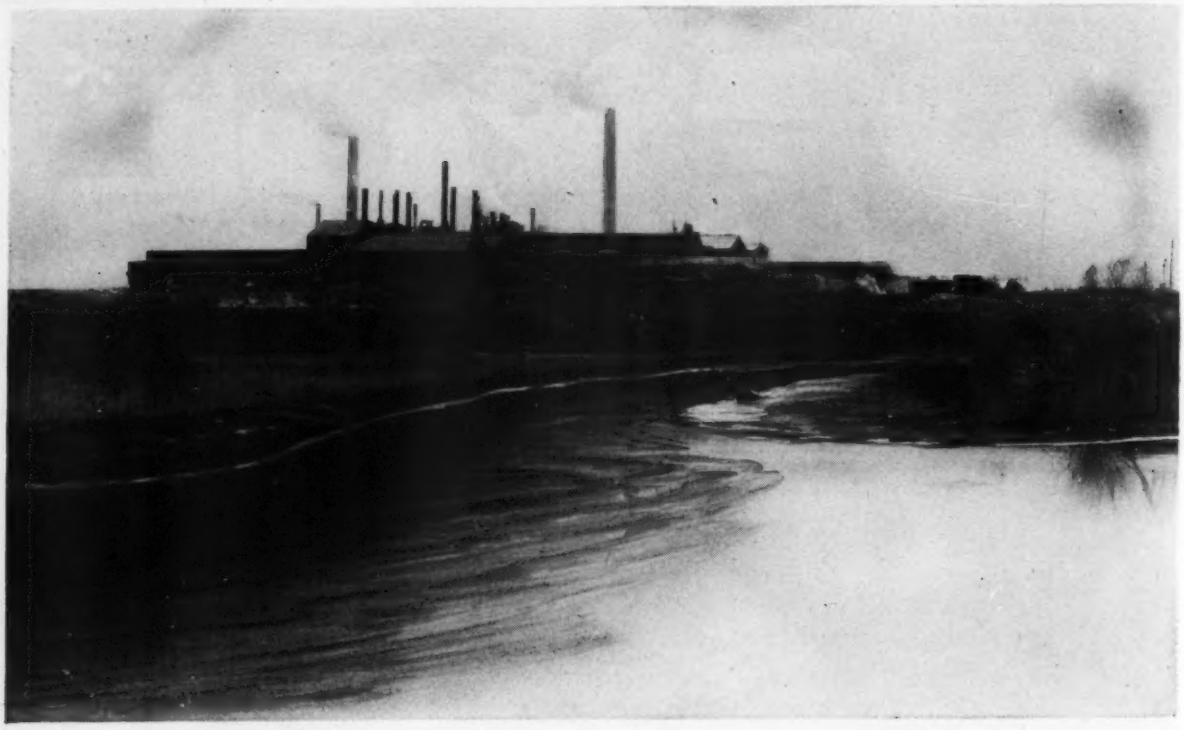
*Trademark

SERVING YOU BETTER • THRU BETTER SERVICE •

Paper Makers Chemical Dept., HERCULES POWDER COMPANY INCORPORATED 961 King St., Wilmington 99, Del.

SIZING MATERIALS AND CHEMICALS FOR PAPER

PPSI-1



WORRIED ABOUT WASTE DISPOSAL?

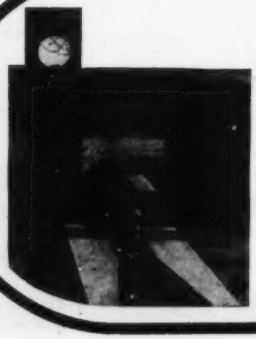
Bailey Meters Help you to Reduce Pollution

● The disposal of industrial wastes without stream pollution calls for careful planning and continuous vigilance.

That's where Bailey Meters and Controls come in. We measure the flow and pH of sewage, sludge, and industrial wastes flowing in open channels or pipe lines. These and other factors, such as levels, rates of chemical feed, and flow of air, may be co-ordinated into a completely automatic system for the treatment and disposal of waste materials.

When you want fast, complete and authoritative answers to the measurement and control aspects of your waste disposal problems, reach for your phone and call your local Bailey Engineer. Offices in all principal industrial centers.

P-24



BAILEY OPEN CHANNEL METERS

These indicating, recording and integrating meters are suitable for measuring industrial wastes, sewage, sludge, corrosive liquids, and irrigation water flowing in all types of open channel primary metering devices, such as Venturi flumes, weirs, or nozzle flumes. Electric or pneumatic telemetering permits location of receivers wherever desired. Ratio of flows and chemical feeds may be controlled automatically.

BAILEY METERS

BAILEY METER COMPANY

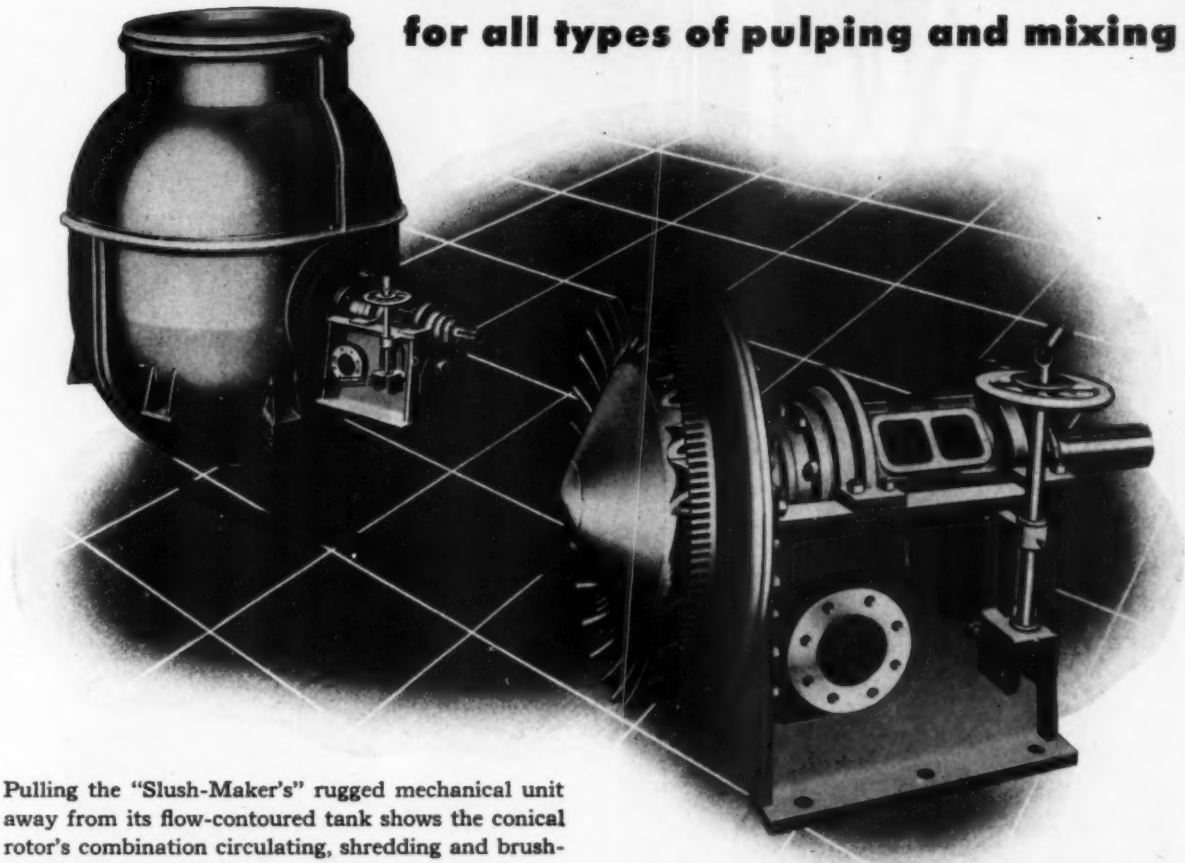
1058 IVANHOE ROAD
CLEVELAND 10, OHIO

Process Controls
TEMPERATURE · FLOW
PRESSURE · LEVEL
GAS ANALYSIS · RATIO

Morden-ize

WITH A Morden "SLUSH-MAKER"

for all types of pulping and mixing



Pulling the "Slush-Maker's" rugged mechanical unit away from its flow-contoured tank shows the conical rotor's combination circulating, shredding and brushing blades, and bars on the stationary attritioning ring

Rapid initial disintegration is given by the rotor's shredding blades.

The positive-flow circulation, across the rotor's face, continually directs the partially broken material at right angles against the bed plate ring.

A hand wheel controlled setting of the rotor assembly can bring the bars on the back of the rotor blades into a brushing contact with the bars on the bed plate ring. This bar-to-bar brushing, when required, will quickly and completely clear all flakes and bundles—even high wet strength—without damage to the fibers.

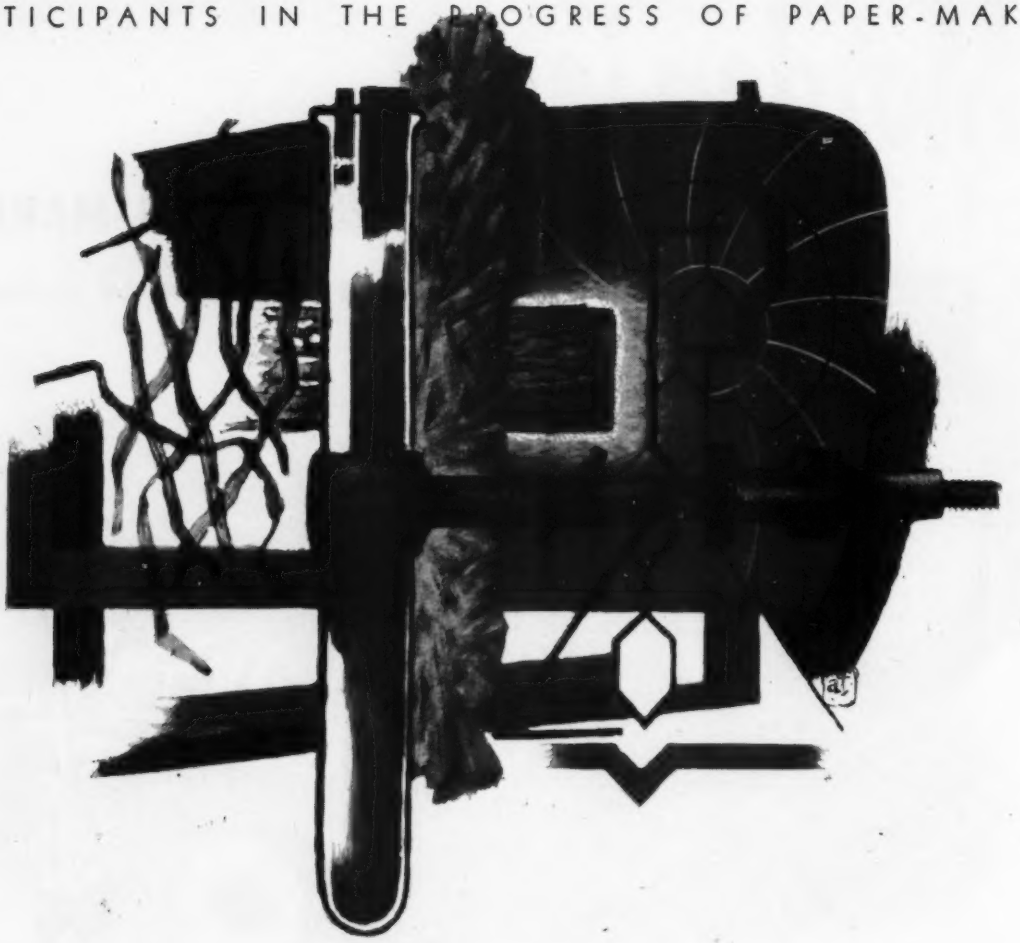
The Morden "Slush-Maker" also thoroughly mixes and brushes in color, size and other materials in a matter of seconds.

The "Slush-Maker's" side mounted rotor quickly and efficiently slushes full charges of pulp, broke or waste paper, either batch or continuous.

Let us know your slushing requirements and we will gladly analyze how you can Morden-ize your pulping and mixing advantageously.

MORDEN
STOCK PREPARATION EQUIPMENT
MACHINES COMPANY
Corbett Building, Portland, Ore.

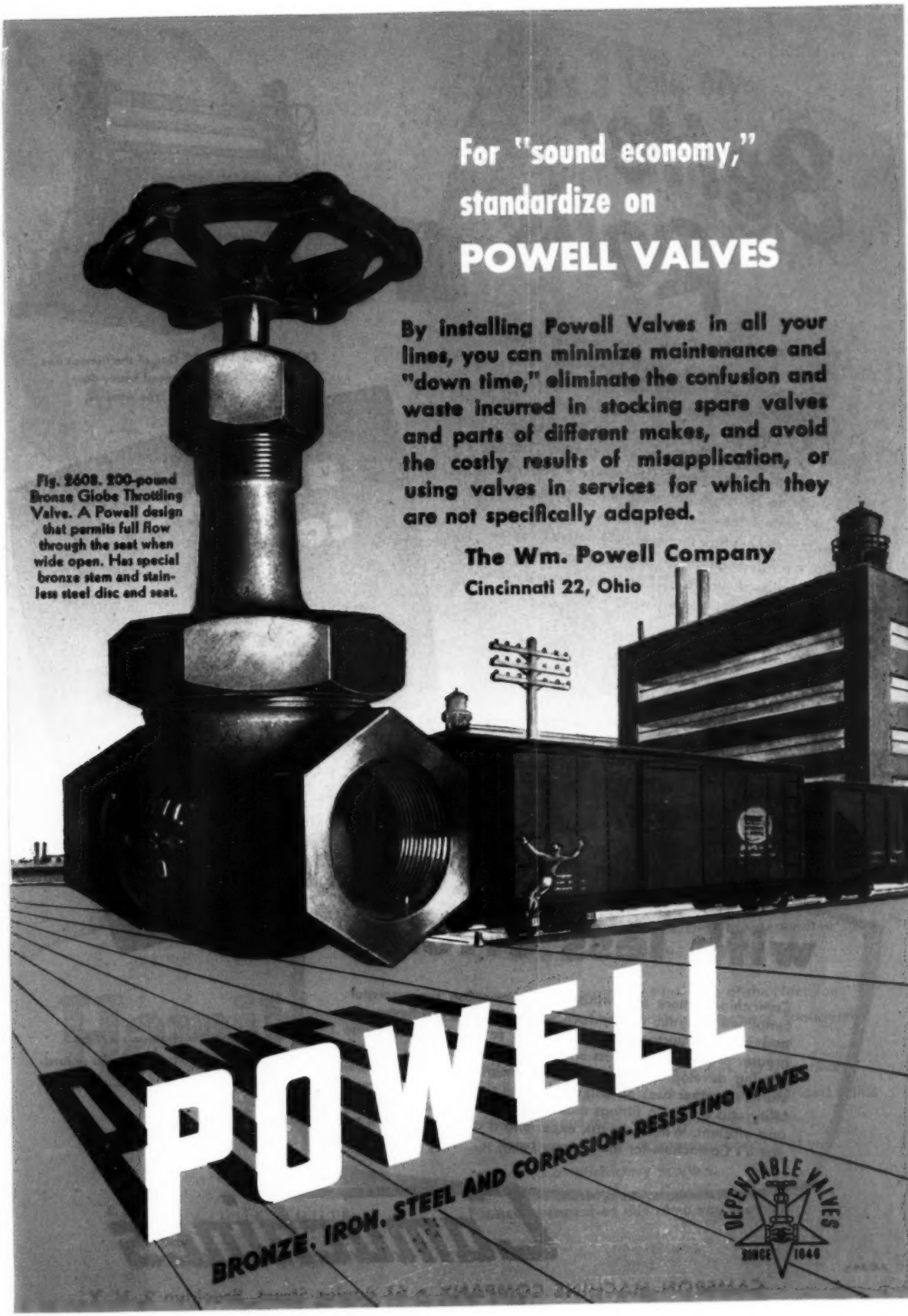
PARTICIPANTS IN THE PROGRESS OF PAPER-MAKING



Chemicals . . . produced by an industry which has made magnificent contributions to paper-making progress through applied research.

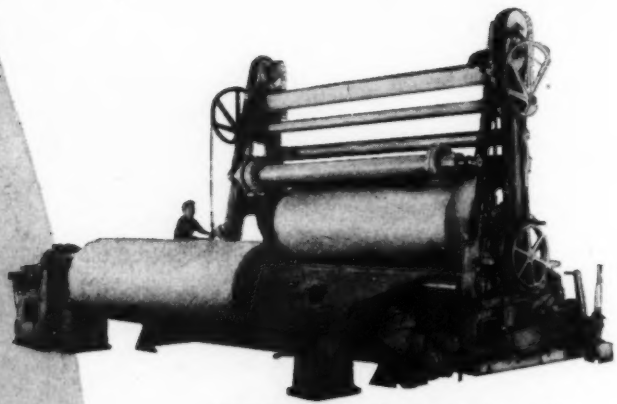
Fourdrinier Wires . . . fabricated for 56 years by Appleton Wire Works, Inc., where continuous research – directed toward making a better product–has *earned* the acknowledgment that *"Appleton Wires are Good Wires!"*

APPLETON WIRE WORKS, INCORPORATED • APPLETON, WISCONSIN

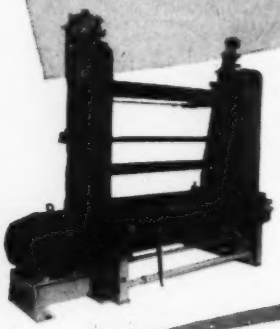

For "sound economy," standardize on
POWELL VALVES
By installing Powell Valves in all your lines, you can minimize maintenance and "down time," eliminate the confusion and waste incurred in stocking spare valves and parts of different makes, and avoid the costly results of misapplication, or using valves in services for which they are not specifically adapted.
The Wm. Powell Company
Cincinnati 22, Ohio
Fig. 2608. 200-pound Bronze Globe Throttling Valve. A Powell design that permits full flow through the seat when wide open. Has special bronze stem and stainless steel disc and seat.
POWELL
BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES
DEPENDABLE VALVES
SINCE 1846

Better Rolls

For two generations Camachines have set the top standards for quality in roll production. Every design feature of modern Camachines has been precisely engineered to help you produce rolls of finest quality . . . clean-cut, wrinkle-free and uniformly wound to the exact degree of "hardness" that you need. Camachine-made rolls stand up better in handling and shipping, and because of their uniform density they feed out with a smooth flow that means complete freedom from unwinding troubles. Ask your customers . . . they will tell you that Camachine-wound rolls are a better buy in every way!



CAMACHINE TYPE 19 One of the famous line of Camachine high-speed heavy-duty mill type winders.



CAMACHINE COMMANDER (Type 10). Popular heavy-duty slitter-rewinder for finishing rooms and converting plants.

at lower cost

Camachine winders and slitters are built to keep downtime, repair and replacement costs at a minimum. Even when operating at Camachine's record-breaking speeds, vibration and consequent wear are virtually eliminated. And when normal wear calls for replacements Camachine's trained service department stands ready to speed the shipment of new parts. Ask your maintenance men and they will tell you why Camachines stay on the job!

with less effort!

Camachine slitters and winders are easier on the operator. Simplified controls, handy facilities for accurate adjustments, and other important operating and safety features mean greater production with less operator fatigue. Camachine engineering developments of advanced design provide for faster starts, smoother braking and quicker roll changes. Easy accessibility and precision fittings make routine maintenance speedy and efficient. When you ask experienced operators they'll tell you it's Camachine for them, every time!

Camachine engineers will be happy to consult with you regarding fast, low cost production, of top-quality rolls.

Camachines®

AA-364

CAMERON MACHINE COMPANY • 61 Poplar Street, Brooklyn 2, N. Y.

It's a long cry from CHIPS to COATED BOARD

Whether you have only one board machine in your mill or a whole battery of machines—whether you manufacture one type of board or a complete line from chip to patent coated—the quality of your product and your daily production are dependent very largely upon the selection of your felts.

By availing yourself of the help of the Hamilton sales engineer, substantial economies can confidently be anticipated. His experience is not limited to small mills or to large operations. He is familiar with every conceivable combination of water and solids known to board mills. He is less concerned to sell felts than to help you produce board that you can sell as a satisfactory product.

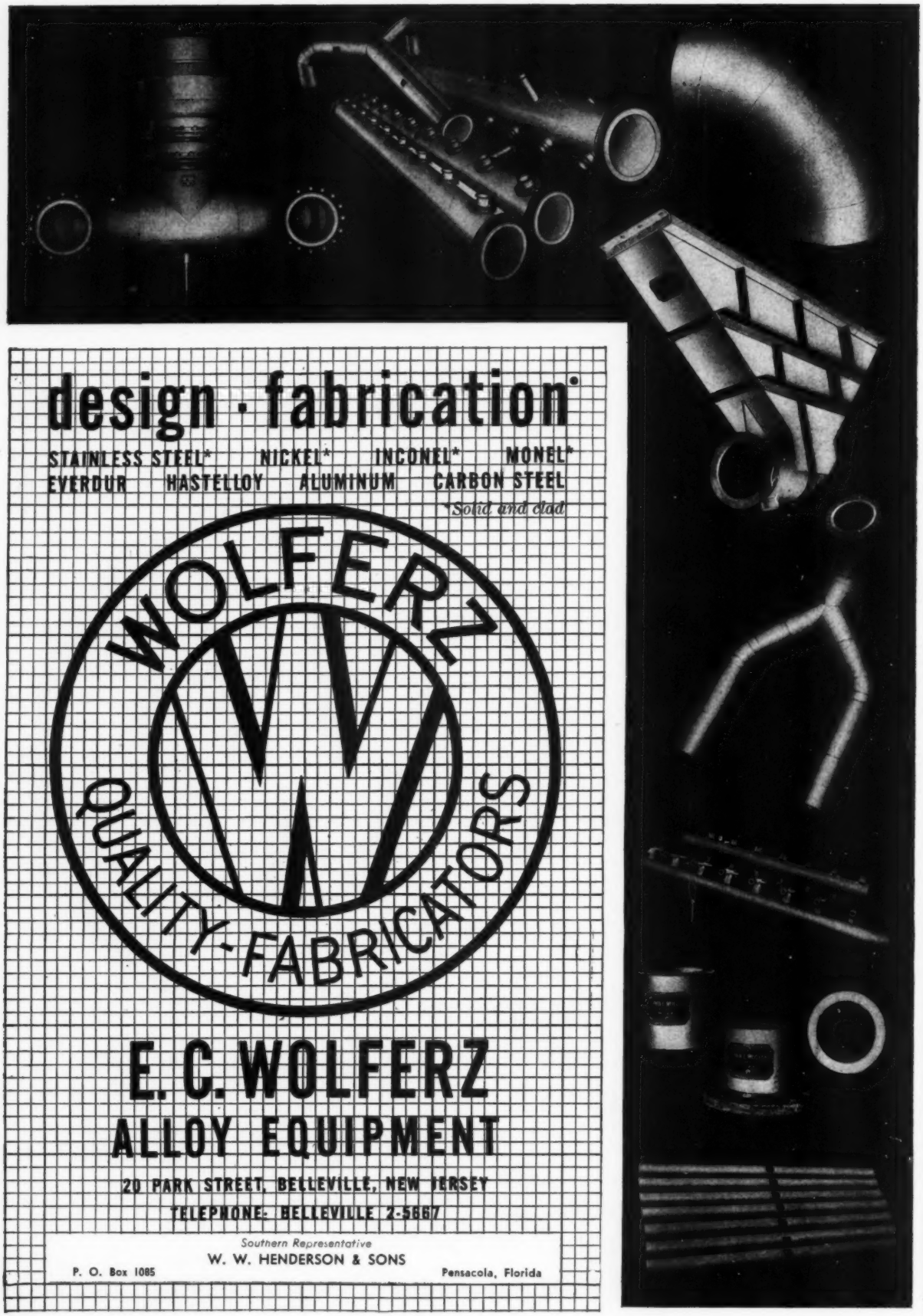
Please remember this when you see him.

Hamilton Felts

MIAMI WOOLEN MILLS

Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO



design · fabrication

STAINLESS STEEL* NICKEL* INCONEL* MONEL*
EVERDUR HASTELLOY ALUMINUM CARBON STEEL
*Solid and clad

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QUALITY-FABRICATORS

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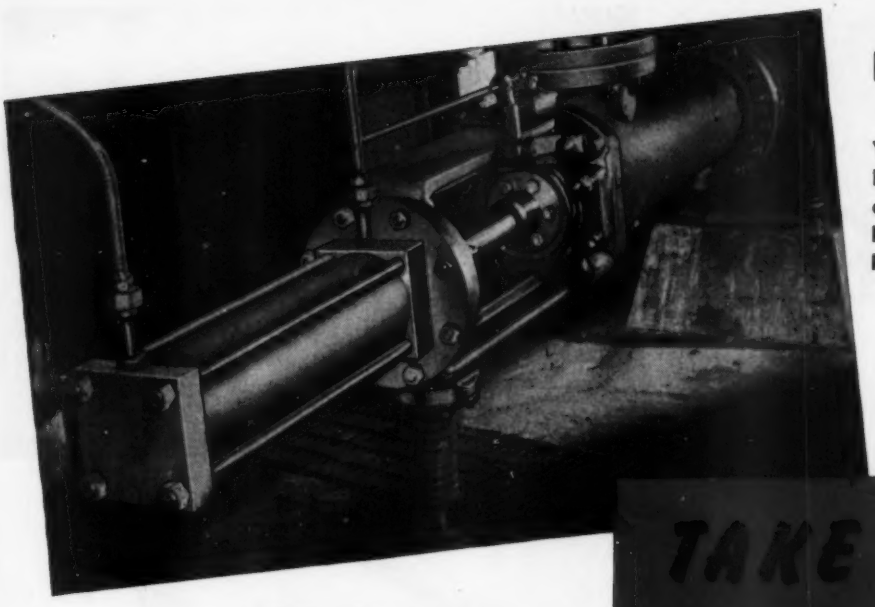


HYDRAULIC-OPERATED

Yarway Digester Blow Valve—one of six installed at large North Carolina paper mill.

TAKE YOUR CHOICE...

MOTOR-OPERATED

Yarway Digester Blow Valve—one of eight installed at large Canadian paper mill.

You can choose between hydraulic-operation and motor-operation when you specify Yarway Digester Blow Valves. Both combine all the following Yarway advantages:

- Remote control, usually from above, on the operating floor.
- Tight shut-off. Effective sealing under full digester pressure. Saves cooking liquor. Insures thorough pulp cooking.
- Free discharge. No pockets. Full discharge with minimum pressure drop. Digester blows clean.
- Rugged construction. Built to withstand shock and wear of toughest service.
- Modern metallurgy—such as sliding plunger of hardened stainless steel and sleeve of chromium nickel—resists wear and chemical action.

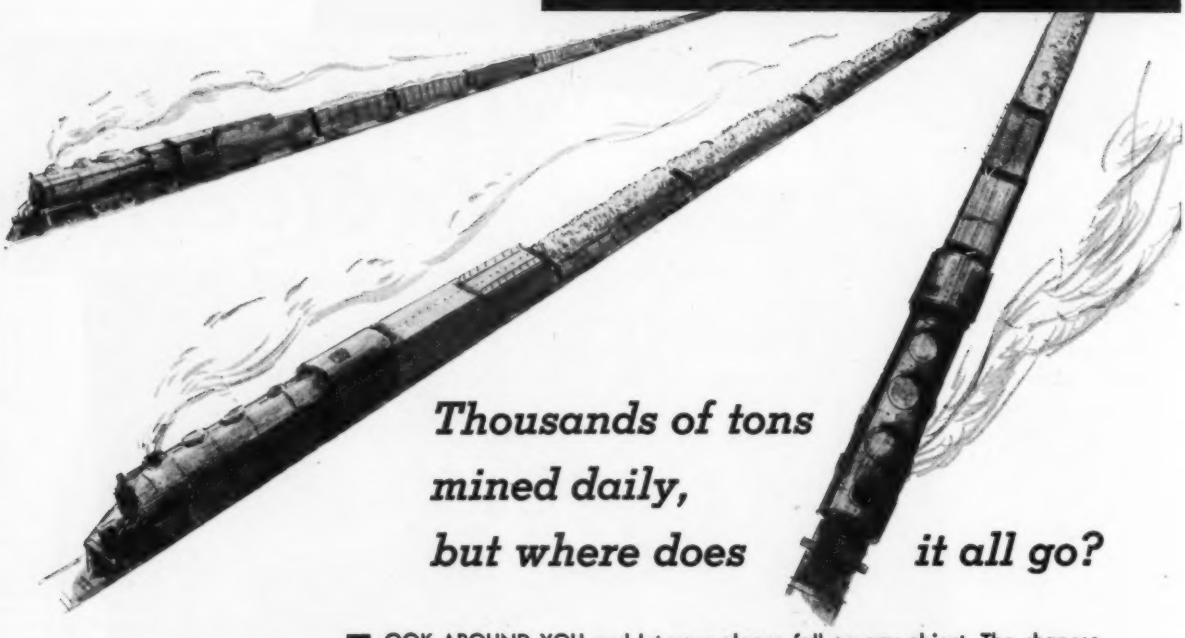
For full details, write for Yarway Bulletin B-440.

YARNALL-WARING COMPANY
149 Mermaid Avenue • Philadelphia 18, Pa.
Branch Offices in Principal Cities

YARWAY

DIGESTER BLOW VALVES

Sulphur



Thousands of tons mined daily, but where does it all go?

LOOK AROUND YOU and let your glance fall on any object. The chances are 1000 to 1 that sulphur played an important role in its manufacture, either as a component part of the finished product or as a processing element.

Take, for example, the very magazine you are reading. If it's average size it weighs about 1 pound. Made largely of sulphite pulp it required about 0.1 pounds of sulphur in its manufacture.

Multiply this 0.1 pounds of sulphur by the thousands of magazines turned out every day and you'll get some idea of the tremendous tonnage of sulphur required for this *single* division of industry . . . the sulphite pulp manufacture.

Sulphur has long been called One of the Four Pillars of Industry. Today's need emphasizes this fact more than ever. Sulphur producers are making every effort to get maximum production from existing mines and to develop new sources of sulphur as quickly as possible.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

LIFTS LOGS like MATCHES

UP—UP—UP she goes, logs held secure by the skid loader's claw-like top grab arm. Here in Crown Zellerbach's mill yard the ground is covered with slippery ground-up bark and waste, but the International crawler gets plenty of traction.

INTERNATIONAL CRAWLER WITH SKID LOADER SOLVES CORDWOOD PROBLEM FOR BIG WASHINGTON MILL

When it comes to moving logs around, there's nothing made to match a skid loader mounted on a rugged International crawler—a team that caught the eye of Crown Zellerbach Corp., Camas, Washington.

This big paper producer got a TD-14A crawler with a skid loader on it, set it to handling the cordwood. The TD-14A and skid loader moved these 8, 16 and 20-foot logs so fast and efficiently that Crown Zellerbach soon bought two more machines just like it.

Now the three units handle 300 cords per 16-hour day, unloading the logs and carrying them to the storage pile, or moving them from the pile to the saws—with round trips ranging from 500 to 2,300 feet.

See this fast-moving, large-capacity outfit for yourself. Let your International Industrial Distributor put International "*Power that Pays*" to work for you!

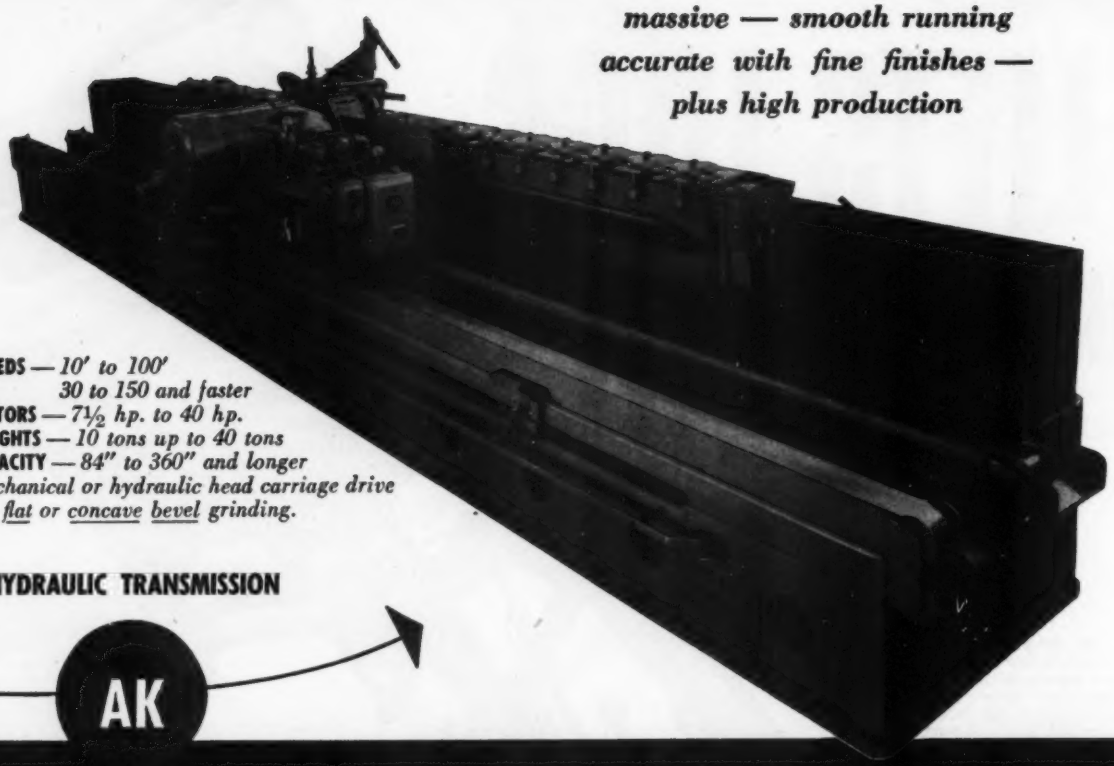
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

massive — smooth running
accurate with fine finishes —
plus high production



SPEEDS — *10′ to 100′*
30 to 150 and faster
MOTORS — *7½ hp. to 40 hp.*
WEIGHTS — *10 tons up to 40 tons*
CAPACITY — *84″ to 360″ and longer*
Mechanical or hydraulic head carriage drive for flat or concave bevel grinding.

HYDRAULIC TRANSMISSION

AK

for the pulp and paper industries

HANCHETT *knife grinders*

FOR GRINDING CHIPPER — HOG — BARKER PAPER TRIMMER — DOCTOR BLADES

GK

FULLY AUTOMATIC TABLE DRIVES
HYDRAULIC OR ELECTRICAL

SPEEDS — *10′ to 80′ per minute (faster if required)*
CAPACITY — *32″ to 184″*
abrasives — segmental or cylinder type grinding wheels

FINEST KNIFE EDGES

HANCHETT MANUFACTURING COMPANY
World's largest manufacturer of knife grinding and saw sharpening machinery
MAIN OFFICE — Big Rapids, Michigan **WEST COAST** — Portland, Oregon

The Paper Industry

January 1953

What's ahead in the paper industry?

The general business barometer points to a new high in 1953. But it does so with a reservation. The reservation is due to the uncertainty of the magnitude of defense spending. The possibility of some moderation of business activity exists despite the fact that the year 1952—scoring up a national total of $340,000,000,000 in goods and services produced—ended with a still rising trend in industrial production and trade.

What are some of the signs of caution in this period of exceptionally high business activity? The volume of speculative buying, usually taking place in anticipation of rising prices, has diminished; industrial purchasing agents are toning down advance commitments; and increased sales and advertising effort is needed to maintain sales volume. National advertising for the first nine months of 1952 is reported to exceed by 10 per cent all of 1951 advertising.

But, on the whole, the outlook continues optimistic. A slight world-shortage of newsprint of 2,000 tons is anticipated following the present slight easing of demands. Total world newsprint production in 1953, as estimated by the Canadian Newsprint Association, will be 10,871,000 tons, with Canada supplying more than 50 per cent of this quantity. Of this total production, the free world will use 10,167,700 tons of which the United States will require some 6,000,000 tons, and the iron-curtain countries' requirement—with due regard to their strange habit of concealing output and consumption figures—is estimated at only 705,000 tons. Incidentally, this low consumption in the communist-dominated world must imply either (a) low public buying power or (b) poor readership acceptance of communist newspapers. Neither is a compliment to the regime.

FAO's views on the newsprint situation, too, indicate that present easing of supplies is a temporary condition. Demand for newsprint, it is believed, will increase at a greater rate than added production capacity. The organization, therefore, continues to be vitally concerned with stimulating interest in the production of pulp from straw, bagasse, bamboo, and tropical woods.

Our pulp and paper research institutes predict great non-newsprint pulp demands in the coming years. Stanford Research Institute predicts that by 1961, requirements for non-newsprint pulp will increase by 36 per cent over 1950 levels. Other estimates for 1961 are: 53 per cent increases for multiwall sacks; 23 per cent increases for toweling; 27 per cent increases for sanitary paper; and 40 per cent increases for boxboard. Adding these increases to those that will be required for the new uses continuously discovered in our research laboratories, may leave the Stanford estimate on the low side.

A good summary of what chemists are currently doing in pulp and paper research is presented by Alfred J. Stamm in this issue, while Louis E. Wise and M. A. Buchanan deal more specifically with recent knowledge of the chemistry of the cellulose wood fiber. While some of these investigations may sound too academic to the layman to have much practical significance, it should be remembered that recent research that concerned itself with a study of stress-strain diagrams in 1/1000 sec., as pointed out by Dr. Stamm, is now paying high dividends. It has made possible the manufacture of improved cement bags. Similarly, degree-of-polymerization studies—which are likely to be relegated without further ado to the confines of the ivory tower by practically minded pulp and paper manufacturers—are intimately correlated with fiber strength.

Industrial progress is founded on optimism, not on blind, *laissez faire* optimism, but on one of shrewd scientific planning that successfully applies sound managerial and scientific talent. It is this combined talent that is so successful in widening production and sales horizons, and assuring a continuous supply of new or improved products.

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The Paper Industry Current Comment

Bagasse in the world spotlight . . . paper in Texas . . . and back to normal

Bagasse again achieves top billing in the paper industry news of the month, though more in the field of foreign production than in any plans to use this product in domestic mills.

The advocacy of the use of bagasse for papermaking reached its most authoritative level at a two-week conference in Rome of the Food and Agriculture Organization of the United Nations, attended by some 30 chemists and foresters. These experts predicted that straw, bamboo and bagasse can produce sufficient paper to meet the rising world demand for newsprint and other papers. The announcement added that not only is a pulp industry based on these heretofore unconventional materials a feasible commercial venture, but that appropriate processes exist for the pulping of all of them.

Bagasse

Norris E. Dodd, FAO director, said that there is no doubt that the world's potential supply of pulping raw material is plentiful, and that a report by the organization will tell bankers and governments whether their fields or forests are a possible commercial source of pulp and paper. He added that a study of costs could often indicate the amount of money needed for investment. The FAO advisory board on pulping tests will continue its research. Dr. G. H. Chidester, chief of pulp and paper at the United States Forest Products Laboratory, Madison, was chairman.

While the technical men were studying the use of bagasse at Rome, the Dominican Republic announced plans for the building in that republic of a mill to cost $2,500,000 for the production of newsprint and other papers, at an initial rate of 8,500 tons per year, and a possible development for the additional production of 3,500 tons in later years. The cost of the product is estimated at $100 per ton, as against the present landed price of $240 for imported paper. The decision to build this mill followed successful experimental test runs by two Dominican newspapers, which found the paper could be printed as fast as North American newsprint. The new mill will be built near a huge sugar factory, which will provide the bagasse for the paper mill. While the mill was conceived as a supply for newsprint, the estimates include the production of 2,000 tons of newsprint, 500 tons of writing paper, 1,000 tons for cement bags, 2,500 tons for envelopes, 1,000 tons for corrugated paper and 1,500 tons for cartons and boxes. While some of the cost may be supplied under the United States Point Four program, Dominica expects to finance most of the cost from its own resources.

While Dominica is actually planning a bagasse paper mill, the Cuban government's National Economy Board has gone on record as advocating the construction in Cuba of a bagasse newsprint mill. The Board thinks such a mill is practical and so important that the government should lend technical and financial assistance for its establishment.

Activity in Texas

A new paper mill is envisioned by the formation of a Texas firm, to be known as East Texas Pulp & Paper Co., for the building of a 250-ton per day mill at Evadale, near Beaumont. The wood will be secured from Southwestern Settlement & Development Co., a wholly owned subsidiary of Houston Oil Co. The mill will be built jointly by the Houston company and Time, Inc., the two companies owning equal shares in the new corporation. At least one practical paper man is on the board of directors, R. A. McDonald of Crown Zellerbach being associated with representatives of Time and the oil company. The mill will be designed to produce bleached sulfate pulp and paperboard, though the interest of Time in the organization indicates eventual production of printing paper.

Recovery

That the paper industry has come handsomely out of the slump of some months ago is indicated by estimates that the 1952 total production of paper and paperboard will be within 10 per cent of the total record output of 1951. The big pickup has been in the paperboard field, where production is now approaching capacity. Part of the drop in output was due to a series of strikes in major book paper mills, but the labor difficulties have been overcome, and the book industry is rapidly getting back to a normally high output in proportion to its capacity.

Financial Reports

Paper mill securities have been strong for the last month but have not, as a rule, followed the general upward trend of the securities in Wall Street, which during the week ended December 19 reached a new high for the past 22 years.

Net incomes

Bathurst Power & Paper Co. Ltd.—Net income for the nine months ended September 30 has been estimated at $1,419,031, against $2,491,455 in the same period last year.

Brown Co.—Net profit for fiscal 1951 was $7,430,040, largest in the firm's history.

Champion Paper & Fibre Co.—Net income for the six months ended September 30 was $4,554,479, as against $4,976,552 a year ago.

Crown Zellerbach Corp.—Net income for the six months ended October 31 was $10,817,545, as compared with $11,965,294 for the comparable period a year ago.

Dryden Paper Co.—Net income for the year ended September 30 was $1,098,285, down from the previous year's $1,236,758.

Gaylord Container Corp.—Net in-

The DRAPER Felt
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come for the first half year was $3,602,473, compared with $4,360,281 a year ago.

Hollingsworth & Whitney Co.—Net income for 39 weeks ended September 28 was $1,787,220, as against $2,583,433 in the comparable period in 1951.

Hudson Pulp & Paper Co.—Net income for the year ended August 31 was $2,264,806, as compared with $3,236,612 in the previous fiscal year.

Kalamazoo Vegetable Parchment Co.—Net income for the first three quarters of 1952 was $1,186,857, as compared with $2,701,911 in the same months of 1951.

Kimberly-Clark Corp.—Net income for the six months ended October 31 was $4,302,417, as compared with $5,522,917 for the same period last year.

National Container Corp.—Net income for nine months ended September 30 was $3,076,862, as compared with $7,637,180 in the first nine months of 1951.

New Haven Pulp & Board Co.—Net income for the year ended September 30 was $833,427, compared to $896,638 in the previous fiscal year.

St. Croix Paper Co.—Net income for nine months ended September 30 was $662,361, as against $703,424 a year ago.

United Wallpaper Inc.—Deficit for the fiscal year ended June 30 was $590,628, as compared with a profit of $743,258 in the previous fiscal year.

Dividend declarations

American Writing Paper Corp. has declared a 25-cent extra in addition to the regular semi-annual dividend of 25 cents on the common, both payable December 26.

Consolidated Paper Corp. Ltd. has declared an extra dividend of 75 cents and a semi-annual dividend of 75 cents, both payable January 23 to holders of December 12.

Container Corp. of America voted a 75-cent extra on the common, due December 29 to record of December 18.

Fox Paper Co. ordered a quarterly dividend of 50 cents a share on the common, payable December 12 to stockholders of record December 6.

Glatfelter (P. H.) Co. has declared a special year-end dividend of 25 cents per share on the common, payable December 29 to record of December 19; also ordered: the quarterly dividend of 56¼ cents a share on the 4½ per cent cumulative preferred, payable February 2 to record of January 15, as well as a dividend of 25 cents a common share, payable March 2 to record of February 16.

Great Northern Paper Co. has declared an extra dividend of 60 cents in addition to the regular quarterly 60-cent dividend on the common, both payable December 5 to holders of record November 26.

Hoberg Paper Mills has voted the regular 37½-cent dividend on the common and the 34⅜-cent dividend on the preferred, payable January 1 to record of December 11.

Minnesota & Ontario Paper Co. has declared a quarterly cash dividend of 50 cents on the common, payable January 25 to record of December 31.

Nekoosa-Edwards Paper Co. has declared a dividend of 40 cents and a special of 40 cents per share, both payable December 18 to record of December 1.

Sorg Paper Co. has declared a dividend of 50 cents per share on the $10 par common, payable December 22 to record of December 12; also declared the regular quarterly distribution of $1.37 a share on the 5½ per cent cumulative preferred, payable January 1 to record December 22.

Paper mill corporate changes

Bowater Paper Corp. Ltd., London, Eng., has announced an internal stock sale that consolidates and simplifies the administration of the interests of Bowater Paper Corp. of North America Ltd. In the sale, Bowater of North America, recently formed and wholly owned subsidiary of the British firm, has acquired from that corporation all the common stock of Bowater's Newfoundland Pulp & Paper Mills Ltd.; Bowater Paper Co., New York, N.Y., and Southern Paper Corp. The authorized capital stock of Bowater of North America is 10,000,000 shares of no par value, of which 4,367,732 shares of a declared value of $23,372,245 are being issued to the parent company "in satisfaction of the interests now being transferred by it."

Continental-Diamond Fibre Co. has sold a $3,000,000 promissory note due November 1, 1967, to Penn Mutual Life Insurance Co. Proceeds will be used to retire $1,670,000 of bank debt and for other corporate purposes.

New York Stock Exchange—Stocks

	Closing Prices Dec. 19, 1952	Nov. 20, 1952
A.P.W. Products	5⅝	4⅞
Celotex	17⅝	16⅝
Same Preferred	16⅛	* 16 – 16⅜
Certain-Teed Products	14½	14⅜
Champion P&F Co.	29⅞	29½
Same Preferred	100⅜	*103⅛–105
Chesapeake Corp.	30	30
Continental Diamond	11⅞	11¾
Container Corp.	41⅝	40
Same Preferred	*102⅛–103¾	*102⅛–104
Crown Zellerbach	64⅜	63½
Same Preferred	102⅝	102¾
Dixie Cup	38	35½
Eastern Corp.	17¼	17⅝
Robert Gair	19¼	18
Gaylord Container	26⅛	27
Hammermill	15⅝	14⅜
International Paper	54	51¾
Same Preferred	101¼	*103 –105¼
Kimberly-Clark	48	47⅜
MacAndrews & Forbes	42½	* 41 – 41½
Marathon	23½	23⅜
Masonite	24⅜	25½
Mead Corp.	24⅜	23⅜
Same Preferred	90	* 88 – 89
National Container	10⅝	11⅛
Rayonier, Inc.	36⅜	33
Same Preferred	33⅞	35
Scott Paper	58¼	55
Same 3.40 Preferred	92¼	* 89 – 90½
Same $4 Preferred	104	*102¼–104
St. Regis Paper	20⅛	19
Same Preferred	92	90⅞
Sutherland Paper	25½	25⅜
Same Preferred	110¾	*110 –112½
Union Bag & Paper	46⅜	47
United Board & Carton	14	13½
United Wall Paper	3¼	3½
Same Preferred	* 25¼–27	25⅞
U. S. Gypsum	117	112½
Same Preferred	174	*175 –180
West Virginia P. & P.	80⅝	80
Same Preferred	108¾	*108¼–110

New York Stock Exchange—Bonds

Celotex 3½%	—	—
Champion P&P Co. 3%	110	—
Mead Corp. 3%	—	—

New York Curb Exchange

Am. Writing	9½	9⅜
Brown Co.	10	10⅞
Brown Co. $5 Preferred	—	100
Same Preferred $3	48¾	49½
Great Northern Paper	53¾	51½
Puget Sound	28⅝	29½

*Closing Bid and Asked Prices

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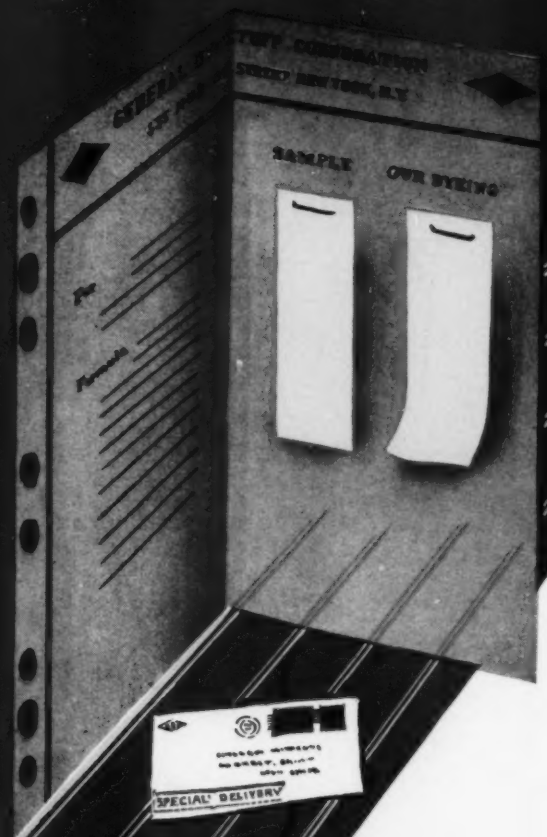

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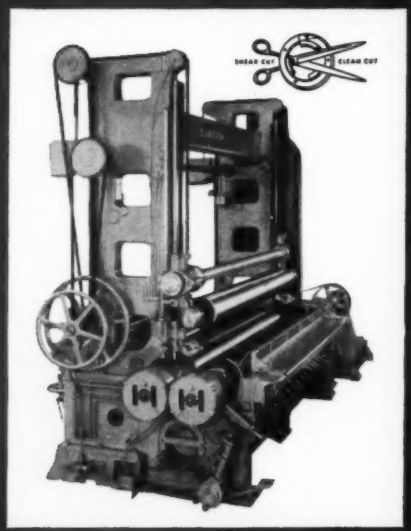

News of the Industry

1951 World Newsprint Production Estimated at Record High

GLOBAL OUTPUT OF NEWSPRINT paper in 1951 has been estimated by the Newsprint Service Bureau at a record high of approximately 10,250,000 tons, or about 5 per cent more than in 1950 and 3,168,000 tons—or 45 per cent—above that in 1946.

The countries of the free world produced more than 9,500,000 tons, or 93 per cent of the world total, while output in the Communist areas is estimated at slightly more than 700,000 tons. On a continental basis, nearly 65 per cent of the world total was produced in North America, while Europe accounted for about 31.5 per cent, and the balance was manufactured in Asia, South America, and Australia.

Far in the forefront among the world's producers of newsprint is Canada, whose 1951 output of 5,516,000 tons represented nearly 54 per cent of the global aggregate of 10,252,000 tons. The United States with an output of 1,125,000 tons was next in rank. The only other country—insofar as is known—to produce more than 500,000 tons was the United Kingdom with 590,000. Production in Canada in 1951 was at an all-time high level, while output in both the U.S. and the United Kingdom was yet below prewar peaks.

Five countries accounted for more than 90 per cent of the over-all increase in world production, as follows: Canada, 237,000 tons; United States, 110,000 tons; Japan, 74,000 tons; France, 28,000 tons, and Russia, 25,000 tons. Production in Italy and the Netherlands also rose by 17,000 tons and 13,000 tons, respectively, while production in Sweden, Finland, and Brazil was in each instance 7,000 tons higher than in 1950.

There was only one change in the 1951 ranking of the 12 largest producers from their 1950 order, i.e., Japan, which, with an output of 219,000 tons, superseded Norway in ninth place. Combined production of these 12 countries—ranging from Canada's 5,516,000 tons to the 101,000 tons produced in the Netherlands—amounted to 9,776,000 tons, or 95 per cent of the world total. Of the countries in this group, the 1951 performance of only Canada, Sweden, and Russia was at an all-time high.

World Production of Newsprint

Country	1951	1950	1946
Canada (a)	5,516,000	5,279,000	4,506,000
United States	1,125,000	1,015,000	771,000
United Kingdom	590,000	609,000	330,000
Finland	461,000	454,000	259,000
Sweden	365,000	358,000	290,000
France	355,000	327,000	133,000
Germany (b)	302,000*	307,000*	150,000*
Japan	219,000	145,000	83,000
Norway	180,000	178,000	121,000
Italy	112,000	95,000	32,000
Netherlands	101,000	88,000	39,000
Austria	84,000	78,000	29,000
Belgium	67,000	68,000	35,000
Poland	55,000*	52,000*	29,000
Switzerland	55,000	52,000	38,000
Czechoslovakia	51,000*	50,000*	36,000
Brazil	38,000	31,000	9,000
Australia	35,000	35,000	34,000
Spain	27,000	25,000	15,000
China	20,000*	20,000*	(?)
Chile	12,000	12,000	6,000
Hungary	10,000*	10,000*	4,000
Turkey	7,000	7,000	(?)
Rumania	5,000*	5,000*	(?)
Bulgaria	4,000*	4,000*	(?)
Portugal	3,000	3,000	3,000
Argentina	2,000	—	(?)
Korea (c)	1,000*	1,000*	(?)
Denmark	(d)	(d)	(?)
Yugoslavia	—	3,000*	(?)
Russia (e)	450,000*	425,000*	130,000*
Total	10,252,000	9,736,000	7,084,000

(a) Includes Newfoundland.
(b) Includes estimate for Eastern Germany of 123,000 tons in 1951; 120,000 in 1950, and 70,000 in 1946.
(c) South of the 38th parallel.
(d) Less than 500 tons.
(e) Includes Estonia, Latvia, and Lithuania.
*Estimated.

Publishers Cite Need for Another Southern Newsprint Mill

Officials of the Southern Newspaper Publishers Association at their recent 49th annual convention at White Sulphur Springs, W.Va., gave it as their opinion that the South has the potentials for still another newsprint mill, the fourth in that region. This opinion was noted in a resolution that called on the SNPA's newsprint mill committee to "continue its efforts to interest new capital in the construction of additional paper mills. . . ."

It was noted at the three-day meeting, attended by more than 500 publishers, that newspapers in the 14-state SNPA area have used more than 1,000,000 tons of newsprint annually. The amount of newsprint manufactured in the South, including the estimated production of a mill still under construction, is less than half the southern demand, according to Cranston Williams of the American Newspaper Publishers Association.

Transportation charges for moving the newsprint to southern publishers from other parts of North America increases the total cost, about which most publishers are concerned. Among topics discussed at the various round tables were ways some newspapers have tried to offset the most recent increase of $10 per ton in the cost of newsprint.

Suction Pick-up System Speeds Newsprint Production

A suction pick-up and transfer system has been developed by Beloit Iron Works, Beloit, Wis., to help solve the problem of transferring the fragile newsprint sheet from the forming section of the fourdrinier to the first press section.

The new development does not rely on any strength in the web. Rather, the wet sheet is picked off the delivery end of the wire section by suction and carried by a felt blanket to the transfer press, where it is transferred by suction and carried on a second felt to the main press section. All this is done at speeds of 1,600 fpm, and it may prove possible to produce newsprint at speeds of more than 2,000 fpm.

The motors driving the rolls of the

NEWS HIGHLIGHTS

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transfer section must obviously run in exact synchronization with the remainder of the paper machine. That was not particularly difficult, as that has been done with multi-section machine drives for years. But it did entail developing controls and drives tailored to just this need. With the first press acting as the speed tie for the transfer section, an additional three-motor helper drive was applied, together with a power supply m-g set and a Westinghouse Rototrol regulator to maintain constant helper torque.

November Newsprint Statistics

Production in Canada (including Newfoundland) during November amounted to 463,435 tons and shipments to 498,987 tons. Output in the United States was 89,842 tons, and shipments were 90,429 tons, making a total North American production of 553,277 tons and shipments of 589,416 tons. This compares with continental production of 567,579 tons and shipments of 590,321 tons in November 1951, according to figures released by the Newsprint Service Bureau.

The Canadian mills produced 142,682 tons more in the first 11 months of 1952 than in the corresponding period of 1951, which was an increase of 2.8 per cent. The output in the United States was 27,200 tons, or 2.6 per cent, greater than that in the first 11 months of 1951, thus the total continental increase over the comparable period a year before amounted to 169,902 tons, or 2.8 per cent.

Stocks of newsprint paper at the end of November were 122,199 tons at Canadian mills and 8,074 at U.S. mills, making a combined total of 130,273 tons, compared with 166,412 tons on October 31, 1952, and 135,604 tons at the end of November 1951.

Great Northern Paper Co.
has ordered a newsprint machine for its Millinocket, Maine, mill that will turn out a reported 325 tons a day. The unit, scheduled for delivery in 20 months, will have a capacity equal to the combined production of four machines now in use.

The Cuban Government
through it National Economy Board has recommended construction of a mill in Cuba to make newsprint from bagasse—a sugar cane waste.

World Newsprint Supply
and demand have come into approximate balance for the first time since World War II, the Newsprint Association of Canada said recently. The association reported that supply would come within 10,000 tons of meeting apparent requirements in 1953.

YANKEE FOURDRINIER paper machine by Beloit recently installed at Hoberg Paper Mills' new $500,000 addition to the Division "A" plant

Hoberg Increases Daily Production 50 Tons with New Yankee

PRODUCTION OF SANITARY GRADE papers at Hoberg Paper Mills has been increased by approximately 50 tons daily with the new Yankee fourdrinier installed recently in a newly constructed plant addition at Green Bay, Wis.

Hoberg's newest and seventh machine was built by Beloit Iron Works, Beloit, Wis., at a cost of more than $1,500,000. Designed for an ultimate speed of 2,000 feet per minute, the unit is entirely air-controlled, with five separate control bench boards governing the fourdrinier, press section, Yankee, reel, and winder operations.

Nearly 18 months of planning went into the design of the machine, with M. J. Auchter, vice president in charge of sales; Robert E. Kissel, general superintendent, and Hoberg's engineering department working closely with the Beloit company. Representing Beloit in the venture were J. E. Goodwillie, Edward Beechler, Donald Curtis, Donald Simonds, and Edward Younger.

Air-cushioned headbox

The 178-inch tissue machine is the first of its kind to be equipped with a Beloit air-cushioned headbox, built as a complete assembly with the distributor and slice. A motor-driven compressor automatically maintains correct air pressure in the chamber of the headbox, while the distributor is of the cross-flow type with passages of shaped and fabricated stainless steel plate.

Beloit has fitted the main slice with a motor-operated lift for adjusting the position of the slice lip, in addition to an adjustment that permits varying the degree of pressure formation.

The fourdrinier features the latest in cantilever, non-shaking design. A maze-like pit removes air from white water as it moves about an inclined base, passes under partitions and is dumped to the fan pump silo, where the pump sucks additional stock to the headbox. A Stebbins tile stock chest with Impco agitation and Poirer consistency control is located on the same floor near the wet end of the machine.

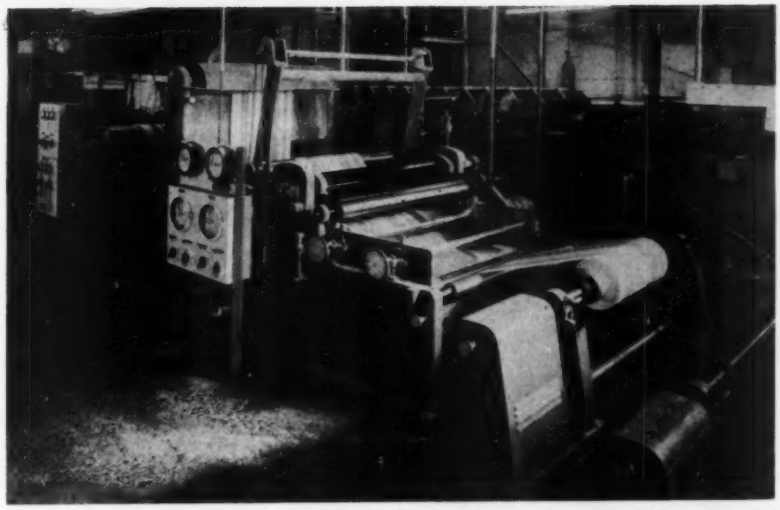
The top couch assembly is air-operated for raising and lowering equipment, with diaphragm equipment regulating the nip pressure between the top and bottom couches. The machine is equipped with suction press and suction pressure roller, with a two-stage Roots-Connersville vacuum pump connected to the suction boxes of the rolls.

Expansion possible

Hoberg's newest machine has a press section designed to provide for the future installation of a second suction press. Provision has also been made for future automatic transfer equipment between the wire and press felt.

Powered by a 250 HP motor, the 12-foot diameter Yankee dryer is the latest in the Beloit high-pressure design and is equipped with a Midwest-Fulton high speed condensate removal system. Creping and cleaning doctor holders, designed for convenient blade replacement, are fitted with electric motor oscillation drive and air cylinder pressure equipment.

Mason-Neilan controls keep the dryer revolving at a rate to avoid water accumulation during shutdown periods. By maintaining low steam pressure, start-up time is reduced to a minimum.



WAXING MACHINE recently installed at Pacific Waxed Paper Co. in Seattle; the new unit, a 72-inch, three-roll waxer, was built and installed by Dilts Machine Works, Fulton, N. Y., a division of The Black-Clawson Co.; capable of speeds to 1,000 feet per minute, the principal products waxed on the equipment include quality bread wraps, rotogravure printed frozen food wrappers, and carton overwraps; rolls up to 40 inches in diameter can be handled

Steam pressure, water temperature to felt showers, and air temperature to the Yankee are controlled by Mason-Neilan equipment.

Trim from the Yankee and winder goes directly to the basement of the building housing the new machine, where it is repulped in a Shartle Brothers pulper and returned to the machine chest as stock.

Sectional drive

The machine is equipped with a sectional drive and electrical installations by Reliance. An electrical gallery in an air-conditioned room just off the main basement houses a 600 hp Reliance synchronous motor that powers three Reliance generators on a common shaft.

A canopy installed over the winder draws dust into the Ruemelin dust collection system set up at the dry end of the machine to alleviate lint conditions. A three-ton crane is used for lifting rolls from the reel to the rewinder, in addition to a 20-ton P&H bridge crane utilized for heavy lifting jobs.

The paper machine is painted a soft green, conducive to safe operation, general efficiency, and better housekeeping. All machine controls are set in consoles conveniently arranged and located for efficient operation.

Time Inc., Oil Firm Join to Build Mill

Formation of East Texas Pulp & Paper Co. for the purpose of constructing a pulp and paper mill at Evadale, Texas, was announced in December by Houston Oil Co. of Texas and Time Inc. The plant, which is to be located 15 miles north of Beaumont, will be designed to produce bleached sulfate pulp and paperboard at the rate of 250 tons per day.

The mill will draw a substantial part of its wood supply from lands owned by Southwestern Settlement & Development Corp., a wholly owned subsidiary of Houston Oil. It is expected that construction of the plant will begin in the spring. Houston Oil and Time own equal shares of the equity interest in the new firm.

The proposed board of directors of East Texas will be as follows: David W. Brumbaugh, vice president of Time; Harold Decker, president of Houston Oil; Artemus L. Gates, director of Time; A. G. McNeese Jr., assistant to the president of Houston Oil; R. A. McDonald, a director of Crown-Zellerbach Corp.; Foster Parker, treasurer of Houston Oil; Charles L. Stillman, executive vice president of Time; Gordon Wattles, president of Webster Tobacco Co. and a director of Houston.

Wood Conservation Step Taken by St. Regis; Swedish Equipment Installed

St. Regis Paper Co. has reported a major step forward in wood conservation in the southeast Gulf region through the utilization of barked sawmill slabs in the manufacture of kraft pulp and paper. Such slabs, if not barked, would be burned. The report was made jointly with W. T. Smith Lumber Co. of Chapman, Ala.

Barking equipment is now being installed at Smith's plant in Chapman, and chip shipments to St. Regis' "Kraft Center" in Pensacola, Fla., were expected to begin by the end of the year. This marks the first adoption in the area of a practice of improved usage that promises to add substantially to the over-all wood resources of the South. In addition, it will provide the sawmills with a steady and profitable market for what in the past has been largely wasted material.

The application of such a conservation measure in the southern field was dependent on the development of production through the use of a barker and chipper at relatively low cost. The Andersson barker and chipper to be used by W. T. Smith at Chapman represent the results of a close study of the requirements in the southern states. The equipment is manufactured by Soderhamn Machine Mfg. Co. of Sweden.

Small power requirement

According to St. Regis, a significant feature of the Andersson barker is the small amount of power required, in contrast with the large power needs of such equipment in operation on the Pacific Coast. Other features include the ability to bark logs of various lengths and the fact that it is a dry barker, resulting in bark immediately usable as fuel.

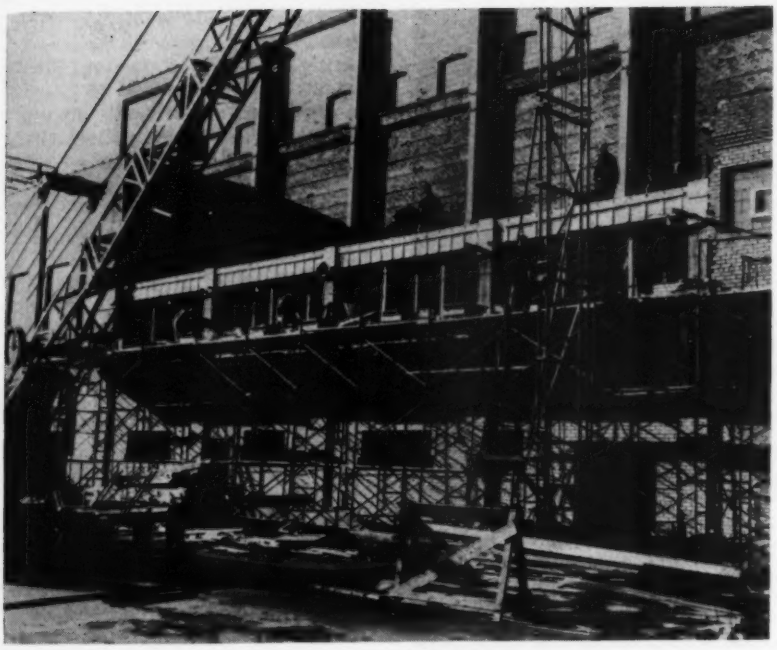
At the Smith sawmill logs are brought in from the woods in long lengths. After cutting into 12 and 20-foot sizes, the logs are to be conveyed by chains to the barker. After de-barking the waste material will be carried on a separate conveyor to the boilers, where it will be used along with sawdust as fuel.

The clean log then moves into the mill for sawing, while the slabs and edgings are carried on a conveyor to the chipper to be cut to specification size for use in manufacturing kraft pulp. W. T. Smith has a capacity to cut approximately 36,000,000 board feet of lumber annually at its Chapman mill. Such a cut could provide St. Regis with chips equivalent to 18,000 cords of pulpwood. This figure is predicated on the generally accepted estimate that in the manufacture of 1,000 board feet of lumber in the southern states there is left sufficient wood to supply the fuel needs of the sawmills, as well as produce specification chips equal to the amount of chips produced from ½ cord of pulpwood.

Additional 200,000 acres

The statement reporting the agreement between the two firms points out that in the southeast Gulf region St. Regis holds 300,000 acres of timberland, while in the same area approximately 200,000 acres are owned by W. T. Smith. It is further indicated that all of this acreage is within economic haul of the Pensacola operations.

Several years ago the Tacoma, Wash.,



NEW ADDITION TO Mando's control lab at International Falls; the building, constructed of structural steel, brick and reinforced concrete, measures 20 by 72 feet

Mando Adds to Control Lab

Continuing its program to step-up its testing and control facilities, Minnesota & Ontario Paper Co. is constructing a three-story addition to its central control laboratory at International Falls. According to J. B. Faegre, president of the firm, completion is expected early this year.

The unit will give the Mando control department a better chance to keep a rigid check on the variety of pulps and papers produced. Because of the firm's expansion into new grades of paper, the technical department is going into more extensive development work. The department is also expanding its testing and control programs. Future testing and control plans include the improvement of the department's over-all quality control program and the further use of statistical methods in quality control.

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kraft pulp and paper mill of St. Regis began experimenting with the utilization of chips cut from the barked wood slabs from sawmills and other wood-using industries in the manufacture of kraft pulp. The company's mill at Tacoma is making use of such chips on a considerable scale.

Some chips are purchased on a long-term contract from sawmills and other wood-using industries in the immediate vicinity. Formerly, a large percentage of the wood thus being utilized had been burned by the sawmills, sash and door factories and plywood mills on the Pacific Coast.

Work Progressing Rapidly on Alaska Pulp Mill

Construction work on the new 300-ton per day pulp mill at Ketchikan, Alaska, is proceeding through the winter months on a one-shift basis. The mill, a joint project of Puget Sound Pulp & Timber Co. and American Viscose Co., is to be in operation by next year.

It was expected in December that the docking facilities for which steel pile driving had been finished would be completed in January or February. Excavation of the mill site was 70 per cent completed at the end of October. The foundation, consisting of concrete footings, for the pulp mill storage building is progressing satisfactorily, according to officials of the two firms involved. This will be the first permanent building to be completed. Early in December the main sewer line for the main pulp mill was nearing completion. The stripping of muskeg and excavation of rock for the pipeline that will carry the mill's water supply was also well underway.

Ward Creek is being rerouted through a diversion tunnel so that the excavation to bed rock and construction of the dam can be carried out. While the foregoing work is progressing, forestry engineers are already on the job working out comprehensive logging plans against the day when the plant will be ready to operate as Alaska's first pulp mill.

Expansion Notes

Marathon Corp.
was to begin construction in December on its new single-story graphic arts building in Neenah, Wis., to house the firm's photo-engraving, rotogravure, and electrotype departments. Designed by John Sommerville, the structure is to be ready for occupancy about August 1953, following the installation of special equipment. The building will cover an area approximately 200 by 240 feet, with working space of about 43,000 square feet.

Aetna Paper Co.,
division of Howard Paper Mills Inc., at Dayton, Ohio, is embarked on the third and final phase of an expansion program estimated to cost in excess of $500,000. Completion is expected in five or six months, according to delivery of new papermaking equipment.

Certain-Teed Products Corp.
has opened its new $3,500,000 gypsum board mill at Pryor, Okla.

Technical Tape Corp.,
manufacturer of adhesive, cellophane, and surgical tapes, has established a research division in a newly leased building in the Bronx, N. Y. The building is adjacent to Technical Tape's main plant.

Portugal, Holland, Pakistan Report New Mills; Swedish Pulp Output Drops

Three "free world" nations have announced plans to construct pulp and paper mills. All will utilize raw materials still more or less on an experimental basis.

It has been reported in Lisbon that Portugal is about to manufacture paper and cellulose. Raw material will be bleached cereal straw, a process said to have given excellent results in Italy, France, and Spain, where paper made from straw is being used for wrapping food products. The new plant will be located near Mourao, about 15 miles from the southern border. Construction will start early this year, with initial capacity expected to be about 20 tons of paper per day. This production may later be expanded to include a daily 15 tons of cellulose if additional power becomes available.

A potential 12,000 yearly tons of high-grade bleached pulp has been added to the European supply with the opening of a new straw pulp mill at Arnhem, Holland. The mill was financed jointly by the Netherlands government and the Dutch Enka Co., with technical control in the hands of the former Cellulose Development Corp. of England.

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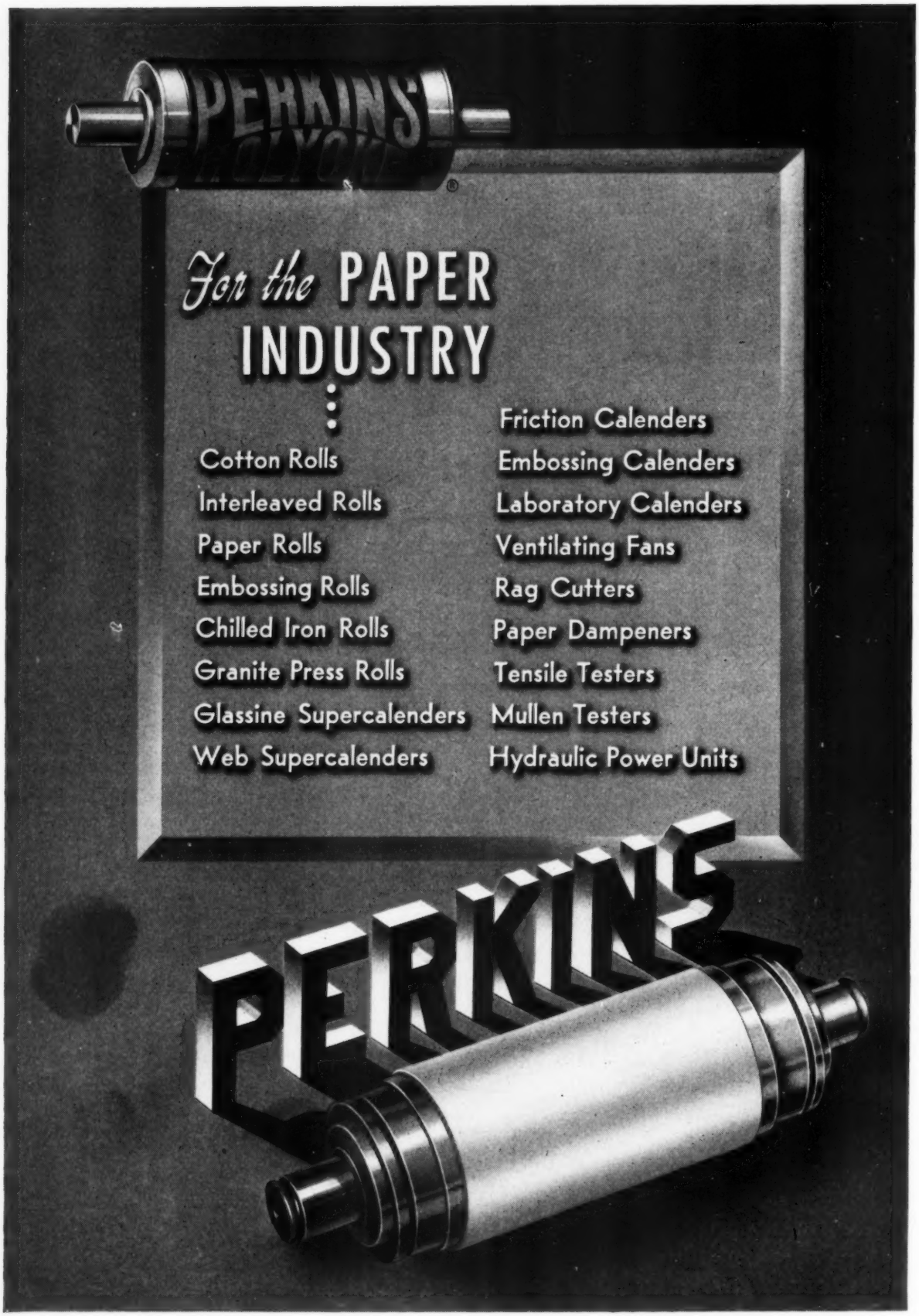
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Rag Cutters
Paper Dampeners
Tensile Testers
Mullen Testers
Hydraulic Power Units
PERKINS

Corp. has started construction work on a 30,000-ton paper mill in the Chittagong Hills Tract, a 7,500-ton high-grade paper and board factory at Nowshera, and a 7,500-ton strawboard factory in the Punjab. With the completion of these three projects, Pakistan hopes to supply about 90 per cent of its paper needs, with the exception of newsprint. Laboratory experiments are now in progress to determine the suitability of certain East Bengal woods for the manufacture of newsprint.

Plans for construction of a $2,500,000 plant for the manufacture of newsprint and other papers from bagasse in the Dominican Republic were announced recently. Initial capacity will be 85,000 tons a year.

Production of chemical pulp in Sweden during the third quarter of 1952 was about 20 per cent below that of the like period of 1951, but stocks by the end of August were high. The recent decline in prices enabled the industry to make larger sales in the United States, and exports of pulp to the U.S. in September exceeded those in any one of the preceding four months.

Weyerhaeuser Sells Excess Power Production

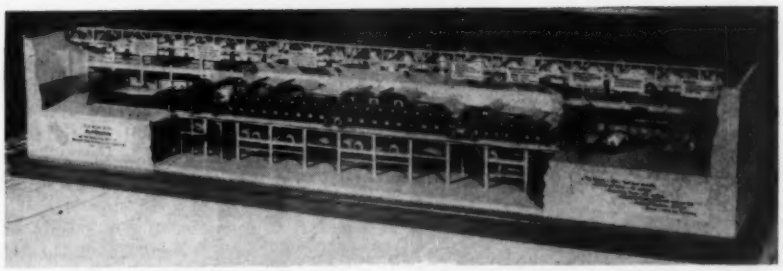
During power shortages in the Pacific Northwest, Weyerhaeuser Timber Co.'s generators step up kilowatt production, and the extra electricity is sold to local power companies and public utility districts.

Six Weyerhaeuser plants are interconnected electrically with the Northwest Power Pool and are delivering approximately 1,500,000 kilowatt hours per week to the pool during the current shortage, while withdrawing less than 500,000. This is a net gain to the pool of more than 1,000,000 kilowatt hours per week, sufficient to supply about 10,000 homes.

The six Weyerhaeuser mills interconnected with the pool are the Everett, Wash., pulp division and the lumber division plants at Snoqualmie, Enumclaw, Raymond and Longview, Wash., and Springfield, Ore. Of these, only the Everett pulp mill regularly takes energy from the pool. On an average week—before curtailments were ordered by the Defense Electric Power Administration—the mill was using 334,000 kwh of pool energy.

This production of power at the firm's mills is one result of the effort to use as much of the forest harvest as possible. In this instance, electrical energy is created from bark, sawdust, and other left-overs that might otherwise be wasted.

Although outside the Northwest Power Pool area, branches at Klamath Falls and Coos Bay, Ore., are delivering substantial amounts of electricity to local power firms. The Klamath Falls branch furnished California - Oregon Power Co. 143,000 kwh in one week recently, while the Coos Bay branch at North Bend was supplying 670,000 kwh to Mountain States Power Co.



REALISTIC SYMBOL of Nekoosa-Edwards Paper Co.'s expansion and modernization program is this scale model of the firm's new No. 9 machine that was displayed at the NPTA convention in Chicago in October; the scale used—1/5 inch per foot—makes the model accurate in detail and about 5 feet in length; material used was "pine dimension lumber;" machine frames are of light weight reinforced cardboard; the rollers are made of dowels, while the drying cylinders are paper rolled to the proper diameter; the fourdrinier screen is surgical gauze dyed copper color; to simulate the liquid appearance of fibers between the slice and dandy roll, acetate was sprayed on the "wire"

Puget Sound Demonstrates Effect of Taxation on Profit

Puget Sound Pulp & Timber Co. in an interim report issued early in December revealed what federal taxes are doing to its earnings, and in addition what double taxation is doing to stockholders. For the first nine months of this year the firm's net earnings before federal taxes were $6.81 per share. The federal income tax took $4.18, leaving $2.63 for the company. Out of this, Puget Sound distributed $1.50 a share in dividends. On this amount, the firm pointed out, the stockholders will pay an additional income tax amounting to probably 25 cents or more.

Continued Rise in Tall Oil Production Forecast

"Increasing experience in the use of tall oil in such important consumer industries as linoleum, lubricant, paint and varnish, soap and others, together with an ever widening range of application in other fields, indicates a continuance of the sharp upward trend in the production and sales of the 1941-51 period over the next 10 years at least."

This statement was made by A. E. Griffin, sales manager of the chemical division of Camp Mfg. Co., in an address during the annual convention of the Paint, Varnish & Lacquer Association in Chicago.

Speaking as a representative of the southern pulp and paper industry, Mr. Griffin declared that over the past 30 years the industry in the South had approximately tripled its output every 10 years; it produces 54 per cent of the domestic wood pulp and about 35 per cent of the nation's production of paper and board.

Production of tall oil, an important by-product of sulfate pulping, has expanded from only 27,000 tons in 1941 to 199,000 tons in 1951. Sulfate turpentine recovery rose in that period from 65,000 barrels to 203,000 barrels. After a rapid survey of the southern industry's background, growth, present assets and future potential, Mr. Griffin summarized by saying, "With intelligent utilization of wood resources, and insistence by the consuming industries not only for sound and ample protective practices but also consistent cutting and replanting programs, the future of the pine-consuming industries would seem to be assured."

U. S. Glossy Paper Demand Met by Industry

A steadily increasing demand for the high-grade glossy printing paper known as coated stock has been met by the United States paper industry through a combination of technical progress and increased capacity. According to a report issued by the National Geographic Society, production has more than trebled since the end of World War II.

"High-Speed" Willow to be Tested as Pulp Source

Rhinelander Paper Co., Rhinelander, Wis., plans to experiment with a new hybrid willow introduced to this country by two Danish foresters, who claim that it will be of pulpwood size within four years after planting. Folke Becker, president of Rhinelander, declared recently that 25,000 slips of the willow have been ordered and will be planted on various soils of the firm's timberland holdings.

The crossbred willow is said to grow 12 feet in the first six months and reach a height of 26 feet in five years. Danish botanists and foresters visiting in Wisconsin told representatives of paper manufacturers that it is possible to grow

WINNER OF TOP HONORS in the paper production classification of the *Financial World's* 12th annual survey of annual reports was Diamond Match Co.; shown above is Perry S. Woodberry (left), treasurer of Diamond, receiving his company's "Oscar" from Weston Smith, vice president of *Financial World*

a tree 10 inches in diameter at the bottom, with sufficient height to cut out two pulpwood sticks, in less than four years.

"We are interested in becoming self-sufficient for pulp," Mr. Becker said. "The Canadians have notified the Wisconsin mills that in five years they are going to stop export of pulp logs. To get Canadian pulp then it would become necessary for American mills to have processing plants in Canada. So now we have to step up our native supplies."

According to the Danish foresters, the pulping characteristics of the willow are similar to those of aspen.

North Central Timber Cut Breaks all Records

A new record both in amount and value of national forest timber cut in the North Central U.S.F.S. region has been announced for the fiscal year 1952. The report was made by J. H. Price, regional forester at Milwaukee.

During the 12-month period ended June 30 a total of 297,502,000 board feet of saw timber and pulpwood were harvested from the national forests in the nine-state region (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, Ohio, and Wisconsin). This is a 14 per cent increase over the 1951 cut of 261,541,000 board feet, which in turn was a 58 per cent increase over 1950.

The value of the 1952 crop was $1,801,183, as compared to $1,337,987 for the 1951 crop. It was harvested by private operators in more than 3,000 sales of which about 2,500 were for less than $500 in timber; only 69 were for sales of more than $5,000. The sizable increase in the timber harvest from these national forests in recent years, according to Mr. Price, is due not only to an active market in pulpwood, but to revised market management plans and to the increasing utilization of aspen.

Aerial surveys

Air surveys of standing timber have recently been completed on several forests in the region, and new management plans based on these surveys allow higher annual cuts than previously. Increased use of aspen by pulp mills and box plants during the past few years enables the Forest Service to sell timber from extensive aspen stands that came in on cutover and burned forest lands in the Lake States.

Seventy-eight per cent of the 1952 crop was in pulpwood species, and the Forest Service anticipates that the cut in these species can be substained or increased if the markets hold up. However, the volume of sawtimber cut annually has remained substantially the same for several years and probably will not increase for many more years —until young stands of such species as red and white pine and northern hardwoods reach maturity. These species mature at 100 years or more, whereas pulpwood species such as aspen, jack pine, balsam fir, and spruce mature at from 50 to 60 years.

Hoberg Plans $2,500,000 Torula Yeast Plant to Combat Pollution

PLANS TO CONSTRUCT America's largest torula yeast plant at Green Bay, Wis., have been disclosed by Hoberg Paper Mills Inc. The $2,500,000 project is the result of efforts on the part of the company to comply with state orders to cut sulfite pollution of the Fox River. Full facts on the program came out as Hoberg filed a formal request with the state Committee on Water Pollution for an extension beyond the end of this year to provide the additional time required to build and equip the big anti-pollution project.

The application to the state was submitted by M. J. Auchter, Hoberg vice president in charge of manufacturing. In it he points out that the job involves three distinct phases. First, a tunnel 3,200 feet long and 6½ feet square must be built between the boiler plant at the paper division and the site of the yeast plant at the pulp division to supply the steam required in yeast manufacture. Second, major rebuilding must take place at the pulp mill so that spent sulfite liquor that now flows directly into the stream can be collected in strong enough concentration for efficient processing. And, third, the yeast plant itself will be constructed and equipped for actually removing from the liquor the wood sugars that are objectionable because they harm fish life.

Completion this year

"Engineering for construction is proceeding rapidly," according to Mr. Auchter. "Construction will commence during the first quarter of 1953 and should be substantially completed by the end of the year. . . . Meanwhile we are installing at once two 125,000-gallon storage tanks which will be part of the completed liquor collection system. Until the yeast plant is in full operation, these tanks will be used to load roadbinder trucks for continuing the roadbinder program that Northern Paper Mills and Hoberg have been jointly conducting since early in 1951."

The heart of the plant will be two "reactors," ceramic tile tanks 26 feet in diameter and 14 feet high, in which torula yeast organisms continuously propagate and feed on wood sugars, while other plant nutrients trickle in and air is steadily bubbled through the liquor to maintain maximum rate of yeast growth. Liquor is continuously bled off from the reactors and pumped to stainless steel centrifuges that operate like cream separators to extract the microscopic yeast organisms. After washing and re-centrifuging, the yeast cream is piped to an ordinary milk dryer and there becomes a powder resembling corn meal in appearance.

Principal uses

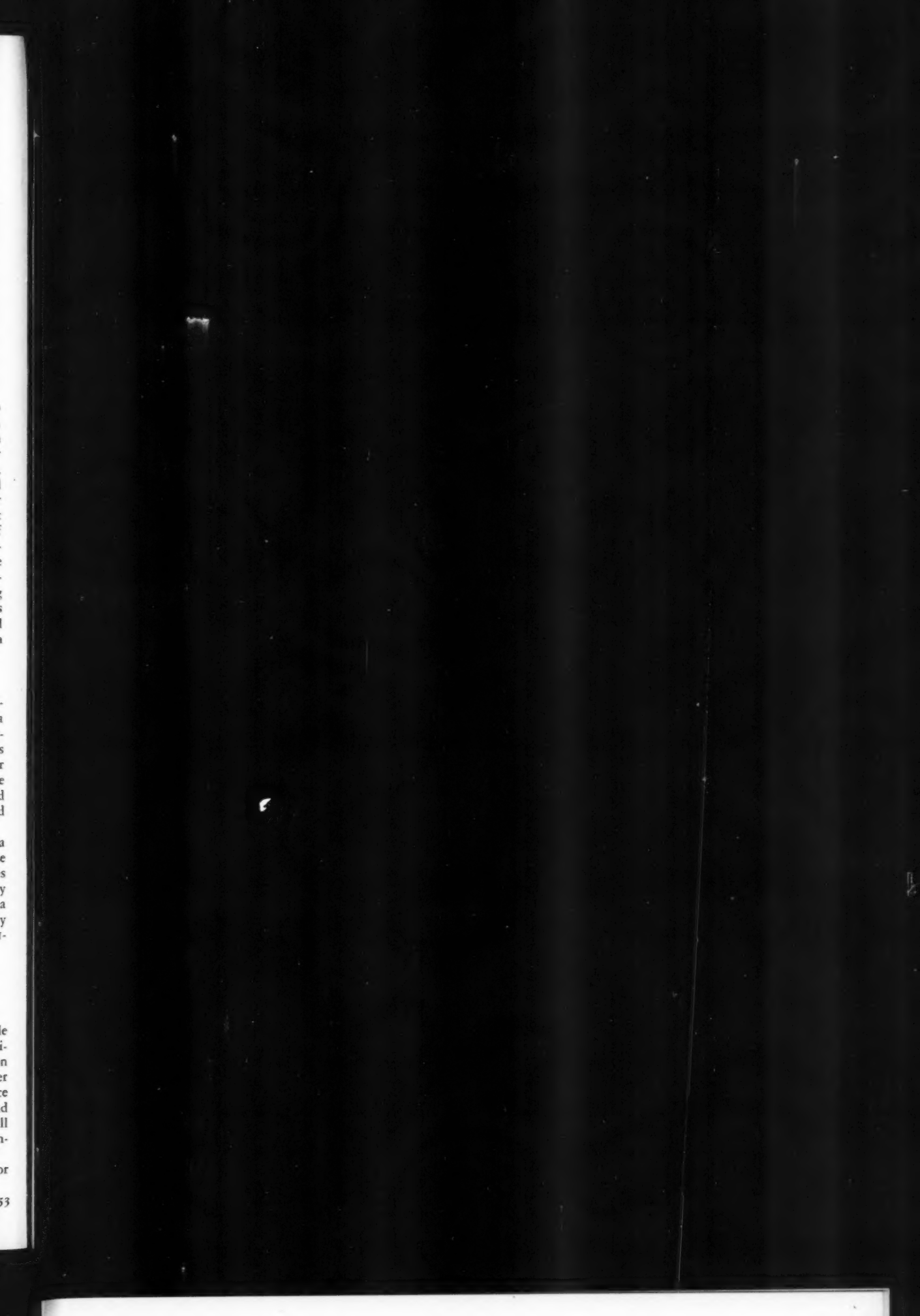
Dried torula yeast now is used principally by the animal feed industry as a vitamin supplement and in the pharmaceutical industry as a raw material. It is also a vitamin-high protein food for humans and was used on a large scale for this purpose in Europe during World War II, but has never been marketed for this purpose in the United States.

Wisconsin already has one torula yeast plant processing spent sulfite liquor. At Rhinelander, Lake States Yeast Corp., a wholly owned subsidiary of Rhinelander Paper Co., operates a plant of approximately half the capacity that Hoberg plans (see THE PAPER INDUSTRY for December, page 1074).

Consolidated Evaporator Plant Nears Completion; Wis. Research Intensified

STEADY PROGRESS was being made early in December in equipping the anti-pollution plant at the Interlake Division of Consolidated Water Power & Paper Co. at Appleton, Wis. All but one piece of the required major equipment had been received for the plant, which will evaporate spent sulfite liquor for burning as industrial fuel.

The last of five stainless steel vapor



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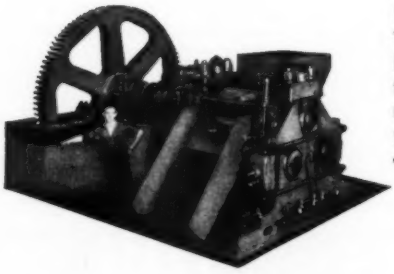

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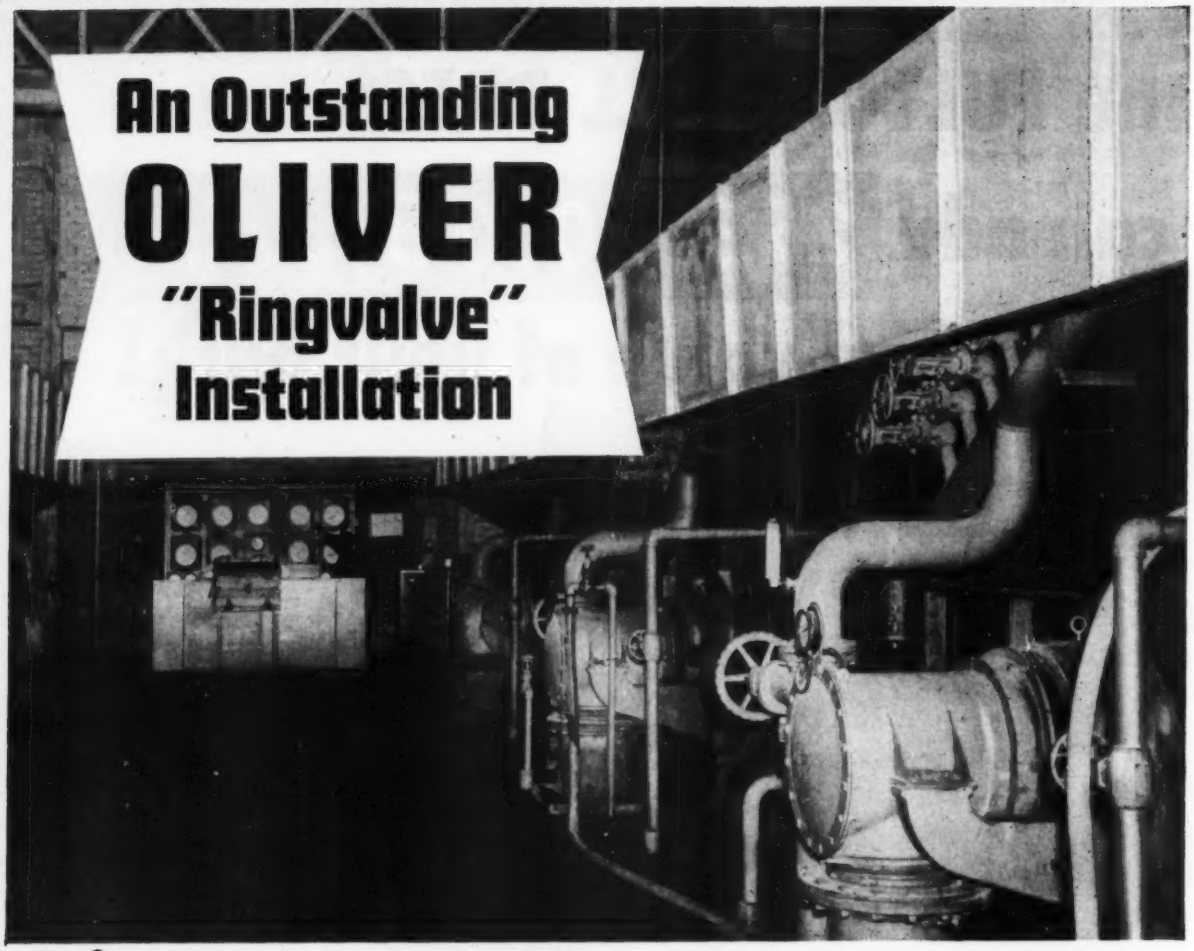

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bodies arrived late in November. Three of four heat exchangers had already been received from the fabricator's Pennsylvania factory and have been placed in position for use along with the auxiliary equipment.

Consolidated placed its orders for evaporator equipment two years ago but until recent weeks was able to obtain only the small parts required. Delays were caused by government controls on the particular types of stainless steel needed in the equipment. The Interlake boiler No. 1 has been converted for burning the liquor concentrate pending completion of the evaporator facilities.

Scientists continue research

Four top-level scientists of the Wisconsin paper industry left late in November for Laramie, Wyo., to make plans for continuing and intensifying a program of research to find new ways of utilizing spent sulfite liquor. For more than two years Wisconsin sulfite mills have provided money for a research grant at the University of Wyoming. That school's Natural Resources Research Institute has highly specialized personnel and equipment for scientific and engineering studies on road construction and related fields.

Spent sulfite liquor is extensively flooded on Wisconsin roads to prevent dust and to stabilize surfaces. An additional use for the material, recently developed and disclosed by highway officials, is for reconditioning and resurfacing blacktop roads at low cost. Closely allied to these uses is the liquor's newly discovered ability, which is not yet full understood, to increase the useful life of asphalt products.

A newly appointed committee of technical experts from the industry is now in charge of the Sulphite Pulp Manufacturers' Research League's studies on using spent liquor with asphalt. Members include: G. K. Dickerman, technical director of Consolidated Water Power & Paper Co., Wisconsin Rapids; C. R. Faulkender, technical director of Hoberg Paper Mills, Green Bay, and W. A. Sherman of Park Falls, assistant manager of Flambeau Paper Division of Kansas City Star Co. Accompanying them on the trip to Wyoming was A. J. Wiley, technical director of the League.

National Council announces New York City meetings

The National Council for Stream Improvement Inc. will hold three meetings in New York, N.Y., in February during the annual meeting of APPA. On February 16 there is to be a joint meeting of the operating committee and the regional chairmen; on the 17th the Board of Governors will meet in annual session, and on the 19th the yearly general session will feature a research review and open panel discussion. All gatherings will be at the Waldorf-Astoria Hotel. (The above schedule is as yet tentative.)

Green Bay P & P To Experiment With Anti-Pollution Equipment

Green Bay Pulp & Paper Co. plans to begin trials immediately on the possibility of using the submerged combustion process for reducing stream pollution resulting from neutral sulfite waste liquor, according to George Kress, president of the firm.

The firm's investigation of the evaluation of the process as made by the National Council for Stream Improvement indicates that it may be adaptable to the Green Bay mill, which utilizes the semi-chemical type operation.

In other efforts to reduce pollution, Green Bay has accomplished considerable process water modification to reduce the amount of fresh water required and to increase wherever possible the re-use of process water. Equipment at the mill has been modified to reduce the polluting character of discharged water, and peak load conditions were minimized by diverting the effluent through a newly constructed ponding system.

The firm's president also explained that the already high yield of pulp has been increased and more effective process control measures installed to reduce the amount of oxygen-demanding material dissolved from the raw wood. The company has succeeded in reducing the amount of oxygen-demanding material per ton of paper by nearly 17 per cent.

Newport Industries Inc.
has announced at Bay Minette, Ala., that it would soon begin construction of a plant to extract valuable oils from kraft paper mill waste. The operation will process black liquor skimmings and crude oil from kraft mills in the South. The skimmings and crude oil will be refined into the oil used in the manufacture of soaps, detergents, paints, and varnishes.

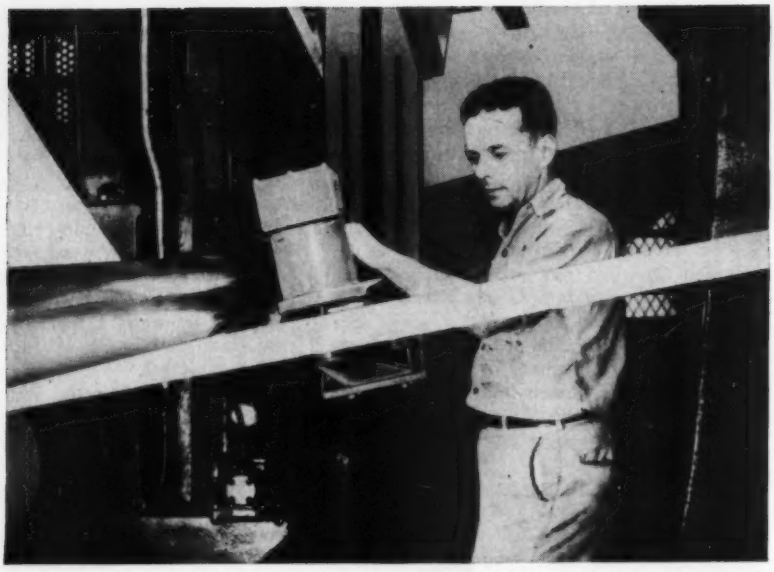
INSPECTING the new roll grinder prepared by Lobdell United for Israel's first paper mill are (l to r): J. G. Wells Jr., Lobdell sales manager; Isaac B. Finkelstein, treasurer of Delaware Hardware Co. and president of the Jewish Federation of Delaware; Sigurd Solvason, project manager for Merritt-Chapman & Scott; Max Feffer; Morris Liebowitz, president of Liebowitz & Co.; Walter Riley, designing engineer for M-C&S; Frank F. Brooks Jr., vice president and general manager for Lobdell; Harry Cohen, president of Ogden Howard Co.; Milton Kutz, chairman of the board of the Jewish Federation of Delaware; K. C. Gardner Jr., president of Lobdell and executive vice president of United Engineering & Foundry Co.; J. Fred Blankenhorn, field engineer; E. L. Durham, Lobdell shop superintendent; Harry Kroengold, field representative; Aaron Barroway, vice president of the Palestine Economic Corp., and Joseph Mazer, treasurer of Hudson Pulp & Paper Co.

Roll Grinder for Israel Mill Ready for Shipment

A final pre-shipment inspection of a huge roll grinder that soon will be installed in Israel's first paper mill was held November 13 at Lobdell United Co's Wilmington, Del., plant. The two major sponsors of the project are the Palestine Economic Corp. and the Mazer family of Hudson Pulp & Paper Co. Their representatives attended the inspection, as did representatives of Merritt-Chapman & Scott Corp., which designed the mill and is supervising construction.

Located at Hadera, a city several miles inland from the Mediterranean at approximately the half-way point between Haifa and Tel Aviv, the mill will be the first in the Middle East to produce printing and writing paper as well as kraft for multiwall bags. Owned and operated by American Israeli Paper Mills Ltd., it will have an initial annual capacity of approximately 12,000 tons. Exclusive of newsprint and tissue papers, it is estimated that the new plant's output will meet 60 per cent of the current over-all annual paper requirements of Israel, which now imports all such products.

Lobdell, which has supplied many machines to foreign countries and is currently building machines for South



ABSORPTION BETA GAUGE installation on No. 1 paper machine at Strathmore Paper Co.'s West Springfield, Mass., mill is checked by Timothy Babcock; use of the gauge, manufactured by Tracerlab Inc. of Boston, has enabled Strathmore to hold sheet weight to less than a 3 per cent variation and to assure more uniform product quality

Africa and India as well as for use in the United States, will have its own field engineer set up the machine and conduct a training course for the personnel who will operate it.

Demand for Paper and Paperboard Strong

Demand for most grades of paper and paperboard continued strong during the fourth quarter of 1952, the Pulp, Paper and Paperboard Division of NPA announced in December. The announcement was made in connection with the publication of the Division's "Pulp, Paper and Board Industry Report" covering business activity in these industries for the third quarter.

Contributing to the improved buying interest in paper and paperboard were the quickened pace of general economic activity, which started in September, and the downward adjustment of inventories in previous months, particularly paperboard in the hands of converters, distributors, and consumers.

Wholesale paper merchant sales in September rose to the highest record for any month of 1952, according to the report. The higher level of sales brought inventories down at the end of September to somewhat lower than the high point—reached at the end of May.

Non-integrated mills suffer

The report discloses that the non-integrated section of the industry suffers a loss of its proportionate share of total production during periods of slackened demand. It is the first such basic production study to be made by type of mill.

Inventory cycles and readjustments are given special attention in the report. Although another inventory buying cycle might develop because of the current strengthened market, more caution is anticipated.

A moderate conservative restraint on inventory buying in the current period should result in avoiding another inventory buying cycle, and as a consequence produce a steady and healthy paper and paperboard market during the coming months, the report continues.

Copies of the NPA publication may be obtained from the Department of Commerce, Division of Printing Services, Distribution Section, Washington, D.C.; Department of Commerce field offices, and the Superintendent of Documents, U.S. Government Printing Office, Washington.

McCabe Calls for Increased Hospital Support

Industrial plants should contribute to the support of hospitals in their areas in order to help prevent the encroachment of state or federal governments on the management of such institutions, according to Thomas B. McCabe, president of Scott Paper Co. Mr. McCabe addressed the 100th anniversary dinner of Episcopal Hospital, Philadelphia.

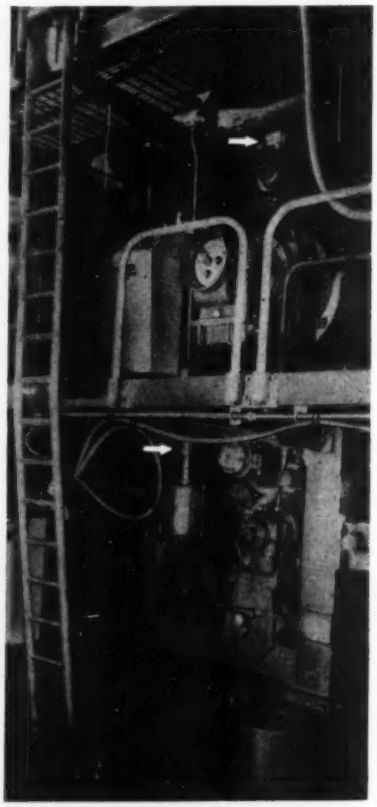
All Scott plants contribute to hospital drives in their respective communities, Mr. McCabe declared, because Scott employees and their families receive treatment in these institutions. The firm is interested in what the hospitals do for its people, he continued, and in order to cooperate more closely the company frequently requests reports on the the aid given.

Mr. McCabe warned against socialized medicine as a result of too much state aid and said that industry must accept the responsibility of supporting hospitals. "It is a dangerous trend for hospitals," he said, "to yield to state aid. Complete state subsidization means state control, and state control is the final slide toward socialism. Industry must help prevent this."

Gibraltar Installs Load Meters

In rebuilding the wet end of its 153-inch cylinder machine, Gibraltar Corrugated Paper Co. of North Bergen, N. J., has installed Downingtown load meters on the suction extractor, suction drum press, all three primary presses, and both main presses.

The load meter is a method of measuring press loadings and employs the strain gauge as its sensing unit. The strain gauge is built into the Baldwin SR-4 load cell and for a 300-pound nip load will transmit to the recording instrument a signal equal to 300 pounds plus or minus ¾ of a pound; for a 500-pound nip load, 500 pounds plus or minus 1¼ pounds.



INSTALLATION OF LOAD CELLS at Gibraltar; lower arrow shows cell mounted as integral part of suction extractor loading air cylinder piston rod, and upper arrow, the cell built into suction drum press top roll bearing housing

The Gibraltar load meter installation employs 26 Baldwin SR-4 load cells. These accommodate the suction extractor and six presses, with a load cell on each end of the suction extractor and the six presses; with a load cell on each end of the suction extractor, and with two load cells on each end of the six presses.

Two indicating-recording instruments are used in the Gibraltar load meter installation, and both are mounted on the plant's central instrument panel. The instruments provide a visual indication of the loads at all 14 points, together with a permanent inked chart record for each point.

Mill Planned for New Brunswick

Construction of a pulp and paper mill in York County, New Brunswick, is to be undertaken by Acadia Pulp & Paper Corp. While the mill is to be built as a groundwood pulp operation, it is possible that it will be developed to manufacture the finished product.

Acadia Pulp & Paper was incorporated by Ralph V. Limerick and Arthur McF. Limerick, both of Fredericton. Negotiations are now being completed for the purchase of the site, and construction is expected to be well underway before the end of the current year.

In selecting York County as the site of the mill, the new firm has chosen a section of the province well covered with softwoods. Every year thousands of cords are cut and shipped from this same area to markets in Canada and the United Kingdom. Arrangements have been made by Acadia Pulp & Paper to ensure an adequate raw material supply.

B.C. Pulp Production Doubles in 10 Years

During the past 10 years the pulp production in British Columbia has doubled, while throughout the whole of Canada output has increased only about one third.

In 1942 B.C. produced 448,000 tons of paper and pulp, while in the past year 962,000 tons were produced. Total Canadian production went from 6,900,000 tons in 1942 to 9,600,000 tons last year.

St. Regis Establishes Five Forestry Scholarships

St. Regis Paper Co. has announced the establishment of five undergraduate scholarships and one graduate scholarship in forestry, effective in the academic year 1953-54. Three of the undergraduate awards will be available in the South, and one each in the Northwest and Northeast. The single graduate scholarship is being offered to first degree holders planning to take graduate work at any accredited school of forestry in the United States.

FINISHED CARTONS fly off the high-speed rotogravure at Gardner Board & Carton Co. in Middletown, Ohio; the onlookers are part of the 10,500 persons who visited Gardner plants in Middletown and Lockland during a recent open house

The awards in the South are being offered at Alabama Polytechnic Institute, the University of Florida, and the University of Georgia. Each amounts to $800 a year for a period of two years and will be given to an outstanding junior in forestry. The award winners are to be chosen by a committee composed of (1) the regional forester of the United States Forest Service at Atlanta; (2) the respective state forester, and (3) Albert Ernest, vice president of St. Regis in charge of southern woods operations.

In the Northwest the scholarship will be available, under the same conditions as those in the South, at either the University of Washington or Oregon State College. The committee of award in the Northwest will be composed of (1) the regional U. S. F. S. forester at Portland; (2) the director of the Forest Service's experiment station at Portland, and (3) Walter DeLong of Tacoma, St. Regis vice president. The Northeastern scholarship is to be available to students at either the University of Maine, University of New Hampshire, University of Massachusetts, or the New York State College of Forestry. On the committee of appointment will be (1) the regional U. S. F. S. forester at Philadelphia; (2) the director of the Forest Service experiment station at Upper Darby, Pa., and (3) A. B. Recknagel, technical director of forestry for St. Regis.

The single graduate fellowship in forestry, valued at $1,000, covers only one year, and the winner is expected to direct his studies along lines of value to the pulp and paper industry. The committee to pass on the applicants for the graduate award will be composed of (1) the chief forester of the United States or his delegate; (2) the U. S. F. S. assistant forester in charge of research, and (3) Mr. Recknagel.

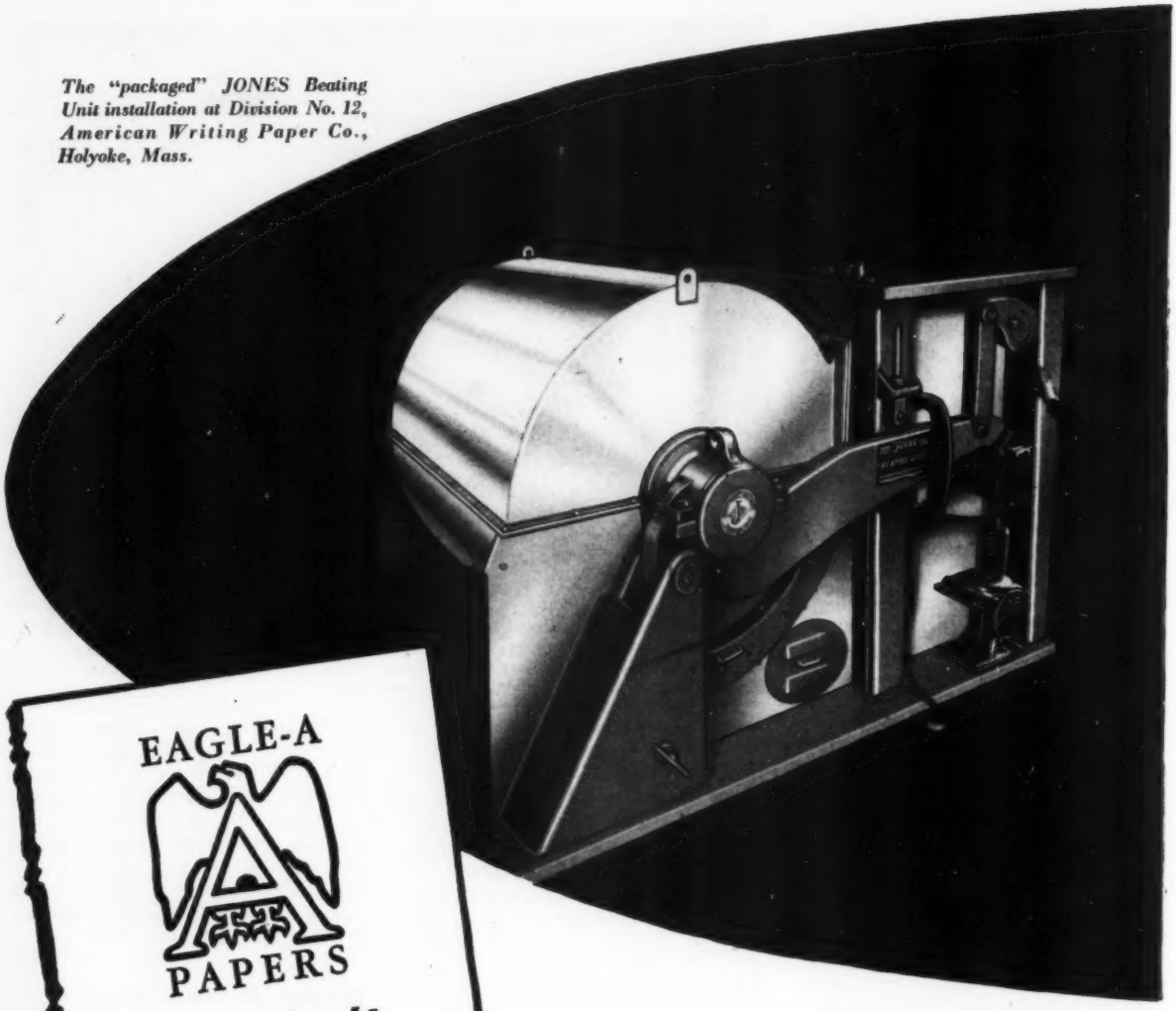
Western Michigan Plans Statistical Control Course

An intensive 10-day course on statistical control in the manufacture of pulp and paper is planned at Western Michigan College, Kalamazoo, for June 15 to 25, it has been announced by Drs. Alfred H. Nadelman and Charles H. Butler. Because of the nature of the problems to be handled and the time allotted, enrollment will be limited to 50.

Arrangements for this course of instruction were made through Tappi, which last summer worked with the University of Maine on a similar study plan. The 1953 program will be the second conducted in the United States.

Dr. Butler, head of the mathematics department at Western Michigan, is handling the details for the course. Dr. Nadelman heads the pulp and paper technology curriculum. Instructors will include Dr. Fred Beeler of the WMC mathematics staff; Dr. Geoffrey Deale of the University of Connecticut, and Dr. C. A. Bicking of the Army Ordnance Corps, Washington, D.C. A group of eight lecturers will augment this staff. Included will be W. R. Purcell of Brown

The "packaged" JONES Beating Unit installation at Division No. 12, American Writing Paper Co., Holyoke, Mass.



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Tappi sponsors fund

A new student loan fund, initially having an account of $1,450, has been presented to Western Michigan College by the Kalamazoo Valley Section of Tappi. In advising the pulp and paper technology curriculum advisory committee of the gift, the disbursing committee of Tappi placed only one stipulation on the use of the fund: that it "will be used for loans to needy and deserving students who intend to enter the paper industry."

MODERN ENVELOPE PLANT opened by Atlanta Envelope Co. recently. The 75,000-square foot structure is designed around a circular flow chart for mass envelope production; daily capacity is 1,500,000 envelopes, with machines now under construction that will boost that figure to 2,000,000

Consumer Products and Integration Stressed by C-Z

A. B. Layton, vice president of Crown-Zellerbach Corp., in a recent address before the Los Angeles Society of Security Analysts, declared that his firm is currently placing heavy emphasis on its consumer products; on integration of operations under the company name so as to identify the corporation with its industry and its products, and on research.

He told the assembled group that C-Z is essentially a Pacific Coast organization, with its principal business done in the 11 western states. The company, rated the second largest paper manufacturer in the country, produces slightly more than 6 per cent of the total U. S. output. As a fully integrated operation, Crown-Zellerbach owns its own timberlands, produces its own pulp, manufactures more than 400 diversified grades of paper, and converts about 60 per cent of its output—other than newsprint and print paper—into a wide variety of products, ranging from facial tissue to multiwall bags.

Merchandising subsidiary

The company, according to Mr. Layton, is unique in the industry, in that it has a wholly owned merchandising subsidiary, Zellerbach Paper Co., which distributes not only the firm's manufactured products, but also 2,000 products of other manufacturers.

Crown Zellerbach, Mr. Layton told the analysts, is essentially a paper manufacturer. It produces no pulp for sale other than surplus that may not be required for its own production. Types of paper made have been diversified to provide greater sales stability. "In the event of a business recession," he declared, "rarely does the demand for all grades fall off at the same time."

The statutory merger of Zellerbach Corp. and Crown Willamette Paper Co. to form the present company was completed in 1937. Pointing out the growth during the 15 years since the merger, Mr. Layton said that sales have increased from $50,000,000 to $246,000,000; annual production from 531,000 tons to 954,000 tons, working capital from $14,-30,000 to $75,800,000, and net income from $6,200,000 to $23,900,000.

Gardner Distributes $60,000 in Back Pay

About $60,000 in back pay is being mailed out to several hundred hourly-paid production and maintenance employees of Gardner Board & Carton Co. at its plants in Middletown and Lockland, Ohio. Distribution of this back pay is based on a recent decision of the Wage Stabilization Board. The board approved the firm's job evaluation plan, which included more than half of Gardner's plant employees.

The plan was a part of the new contracts negotiated during the summer with the unions that represent Gardner hourly-paid workers. It was effective as of June 23, but the firm could not pay the increased rates until WSB approval was given. The back paychecks cover the period from the effective date to December 1.

Saskatchewan Forest Survey Boosts Industrial Hopes

Hopes for the development and expansion of a pulpwood industry in Saskatchewan were increased recently with the announcement of the findings of a forest survey undertaken by the provincial government. Resources Minister J. H. Brockelbank called the province "one of the last remaining undeveloped pulpwood areas in Canada."

According to the survey, Saskatchewan has at least 24,000,000 cords of standing softwood available now for pulpwood manufacture. There may be as many as 30,000,000 cords. In this connection, Mr. Brockelbank pointed out that with a rising demand for paper and paper products "a pulpwood industry should develop here in the near future."

Looking toward the establishment of a newsprint industry, province officials have reported that at least 16,000,000 cords of the known softwood stand are either white or black spruce. Previous surveys showed the province with only 2,500,000 cords of spruce available for pulpwood. The available softwood stand cuts through the province's center in a triangular-shaped sweep, with its base extending along the Manitoba-Saskatchewan border and its apex extending westward across two-thirds of the province to a point northwest of Prince Albert. The area embraces approximately 20,-000 square miles of mixed forest land.

Breakdown by species

The survey revealed a known stand of about 43,000,000 cords of mixed woods, all measuring between 4 and 9 inches in diameter at breast height. Of this total, 24,603,000 cords are softwood, and another 19,080,000 cords are hardwoods. The breakdown by species is as follows:

Softwoods—white spruce, 4,574,000 cords; black spruce, 11,709,000 cords; jack pine, 7,000,000 cords, and other softwoods, 1,320,000 cords.

Hardwoods—white poplar, 14,909,000 cords; black poplar, 2,569,000 cords; white birch, 1,601,000 cords, and other hardwoods, 1,000 cords.

The interest that can be aroused in outside investors is the key to the speed with which the stand will be exploited for pulpwood purposes. Eastern Canadian, U.S., Swiss, and British interests have been studying the possibilities of the area. The latter two have been held up because of dollar shortages.

Other resources

Additional natural resources in the area include potential water power. The provincial resources department has earmarked at least seven water power lo-

cations along the Saskatchewan River, which flows through the 20,000 square-mile softwood stand.

Also found in the area are natural gas and oil and fuel oil reserves. It is thought that natural gas finds in the central region of the province may produce sufficient reserves to allow wide-scale distribution. Additionally, five plants are now producing sodium sulphate salt, with 133,235 tons produced in 1950.

Purchasing Agents Review Paper Supply and Demand

Meeting recently in Toronto the Purchasing Agents' Association of that city reviewed the business outlook in Canada for various industries. In summation, they found that business activity continues at a high level, even in some formerly slack industries, and the outlook is for the continuance of the trend well into the middle of 1953.

In respect to fine and coarse papers, the findings of the commodity and business reporters were as follows: "The situation with respect to supply and demand for newsprint at the present time is closer to being in balance than it has been for some years. Nevertheless, most Canadian mills are still oversold for the next year. There has been very slight, if any, change in market conditions on book paper. Coated paper demand has improved over the past month.

"As a result of continual research, several new papers have appeared on the market recently. Demand for wrapping paper continues to improve, and deliveries are now given as one month from receipt of orders. Prices remain steady, although costs from every angle are rising continually. Paperboard mills are booked to capacity but not beyond. There are evidences that customer inventories are at a very low ebb.

"Demand and production on corrugated paper shipping containers remain at a relatively comfortable balance. Raw material supplies do not present any immediate problem, and deliveries from paper mills are reasonably prompt. Folding carton manufacturers are experiencing a steady demand. Raw materials are in adequate supply, with no change anticipated within the foreseeable future."

Industry Notes

Nekoosa-Edwards Paper Co.
has completed the sale of its Nekoosa-Edwards Light & Power Co. to Wisconsin Power & Light Co. for a reported purchase price of $300,000. The N-E utility firm was established in 1913 and served Nekoosa and Port Edwards. According to John E. Alexander, president of Nekoosa-Edwards, the utility was disposed of because his firm is "primarily in the business of making pulp and paper."

TOURING the Brewer, Maine, mill of Eastern Corp. recently was this group of Improved Paper Machinery Corp. executives and engineering staff members; the group was headed by Impco's chief draftsman, Mark M. Moore; the tour was arranged by John Rich, president of Impco, through Charles G. Paine, Eastern vice president and general manager

Two Bargeloads
of pulpwood being shipped by the Southern Kraft Division of International Paper Co. from Mobile, Ala., to its Camden, Ark., plant were due to arrive at Camden December 12. The movement marked the resumption of barge traffic on the Ouachita River. A company spokesman said that his firm hopes to use the river traffic as a needed supplement to other transportation facilities. The barges proceed down the Intercoastal Waterway, and up the Mississippi to the Ouachita.

A New Type Debarker
was shown to representatives of the paper industry attending the second annual convention of the Upper Mississippi Section of the Forest Products Research Society, which was held in Wausau, Wis., recently. Developed by Donald J. Yeadon of the faculty of Michigan Tech at Houghton, the debarking equipment operates on a new principle. A floating ring of tools makes it possible to peel crooked and knotty pulp logs, as well as straight and smooth surfaced logs. Plans call for making the equipment mobile. The machine is not yet in production.

Virginia Led Southern States
in the rate of increase in pulpwood production in 1951. The jump over the 1950 rate was 27 per cent, with total production for last year at 1,326,300 cords. Three-fourths of this was pine and the remainder hardwoods. Although the state led in rate of increase, it still trails four southern states in the quantity produced annually. These are, in order of production, Georgia, Mississippi, Florida, and Alabama.

Packaging Technology
is to be offered in a four-year course by the department of forest products at Michigan State College, East Lansing. Included will be many engineering and business administration subjects, as well as specialized studies in packing, packaging, and car loading.

Greenwich Paper Products Inc.,
Brooklyn, has changed its corporate name to Greenwich Paper Corp.

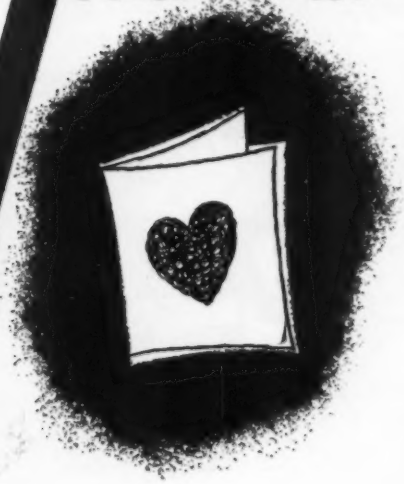
Customs Court Rules on Bagasse Papers

The Bureau of Customs, after many months of investigation and technical studies, has decided that paper and board made from bagasse are not strawboard—for tariff purposes. According to a report by Warren B. Bullock, manager of the Import Committee of the American Paper Industry, the question arose on the importation of bagasse corrugating stock from Peru through the Port of Los Angeles. Customs officials there considered the corrugating medium to be paper not specially provided for and dutiable at 30 per cent. The importer claimed that the shipment was properly dutiable as 9-point straw at 7½ per cent. The Bureau of Customs ruling sustains the classification at 30 per cent. In addition, the ruling automatically applies to paperboard made of bagasse, which will be classified for duty as "other paperboard" at 7½ per cent and not as strawboard at 5 per cent.

Other cases recently decided by Cus-

vellum . . .

valentines . . .



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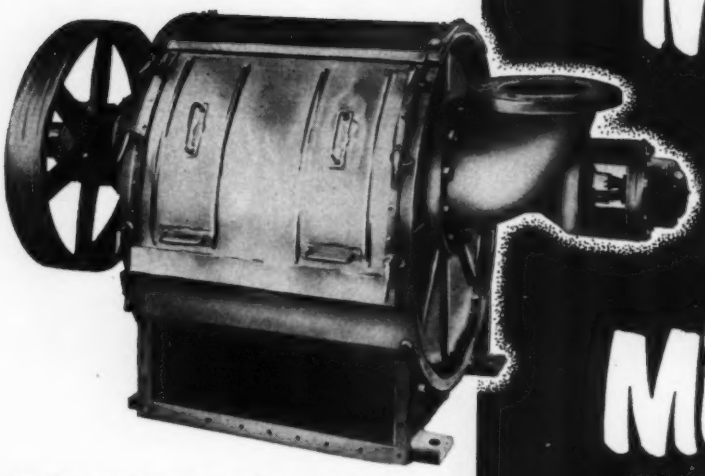

The "Junior" Screen . . . smallest of *three* units producing from 35 to 150 tons per day, respectively.

Money Saving Midgets

Cowan Centrifugal Pulp Screens by
APPLETON MACHINE COMPANY

Added efficiency, greater economy are the watchwords for *Appleton Machine Company's* junior versions of the standard Mark "A" Cowan Centrifugal Pulp Screen, acknowledged as outstanding in its field.

The Mark "E" Screen is a half-sized model of the standard Mark "A", conservatively rated at a capacity of 2400 U.S.G.P.M. accepted stock. 50 h.p. is required to operate the Mark "E", but its drive is designed to accommodate a 60 h.p. motor, wherever needed. The Mark "E" is particularly advantageous in smaller mills, or as a supplementary screening unit. Also, installing two Mark "E" Screens—instead of a single larger machine—provides a definite safety factor in case of breakdown.

The "Junior" Screen is a quarter-sized model of the big Mark "A", with a rated capacity of 1400 U.S.G.P.M. accepted stock. 25 h.p. operates the "Junior" Screen, but it will handle motors up to 40 h.p. Greatest applications are as secondary screening units, and as a primary screen for mills producing a variety of pulp grades which require a system made up of small, separate units.

Performance of these two Cowan Screens is comparable in every way to that of the standard Mark "A" Screen . . . the same high consistency screening . . . low percent rejects . . . good fiber separation . . . low shower dilution pressure . . . top hydraulic efficiency. Typically sound *Appleton Machine* construction plus a protective coating tailored to fit your needs *complete* your assurance of long-time satisfaction.

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WINDERS • FINISHING ROLLS • REWINDERS

NEW CREPE PAPER, said to have nearly three times the tensile strength of former industrial crepe paper and black varnished cambric, which has been developed by General Electric Co.'s laboratory-engineering department at Pittsfield, Mass.; above, the new paper, made from kraft and manila fibers, is being wound on a brazed splice of coil lead and cable

toms officials include the following: tissue paper saturated with synthetic phenol resin as a binder for sheets of plywood has been classified for duty as in chief value of phenolic resin at 25 cents per pound plus 20 per cent, and not as tissue paper at 2½ cents per pound and 7½ per cent; importers of paperboard at New York and Boston have accepted without protest a finding by Customs officials that several shipments from Finland had been undervalued; paper claimed to be cull rolls of newsprint, but over the weight limit for standard newsprint, has been classified for duty as printing paper and not admitted duty-free as standard newsprint, and paper from Canada claimed to be duty-free as standard newsprint has been classified for duty as printing paper because of its excessive bulk, characteristic of novel news.

Importers have filed protests against a ruling of undervaluation on 20 shipments of Finnish wrapping paper imported through Philadelphia and one of greaseproof imported through Baltimore. Fancy colored paper for box tops classified for duty as articles of coated paper at 5 cents per pound and 10 per cent is claimed by the importer to be dutiable as photographs at 12½ per cent, because decoration was produced by photo-etched plates. Trunk, insole, and pattern boards from Belgium classified for duty as paperboard at 7½ per cent are claimed by the importer to be dutiable at 5 per cent as wet machine board. Paperboard from Guatemala classified for duty as test container board at 10 per cent is claimed to be dutiable at 5 per cent for strawboard.

New problems involving the dutiability of various types of paper continue to come before Customs officials, according to Mr. Bullock. Among recent cases are the following:

The dutiability of pulpboard made from bleached straw; greeting card stock in which flower petals or butterfly wings are laminated to the paper with a surface lacquer; mulch paper for the protection of growing Hawaiian pineapple. The latter has been claimed to be duty-free as agricultural implements, but on the advice of the Import Committee will be classified at 30 per cent as paper not specially provided for. After many years, importations of bowl paper have been resumed. This paper compressed into calendar rolls for use in the textile industry has hitherto been classified as paper not specially provided for.

Ample Sulfur for '53; Free World Ups Production in 28 Projects

A SUFFICIENT SUPPLY of sulfur to meet all demands of domestic users is in sight for 1953, after two years of world shortages that brought about restricted usage here and an international allocation of the material, according to a recent statement by Langbourne M. Williams Jr., president of Freeport Sulphur Co.

Government estimates place the United States supply for this year at 7,000,000 long tons, an increase of about 500,000 tons over 1952, and consumption, plus exports, at 3,637,000 tons. Enough new production is developing, Mr. Williams said, to stave off the threat of any new shortage such as that which began at the start of the Korean War.

New Sulfur Projects Entering Production in 1952

Firm	*Capacity**
Freeport Sulphur Co. Bay Ste. Elaine, La.	100,000
Texas Gulf Sulphur Co. Spindletop, Texas	400,000
Chemical Corp. of America Sulphurdale, Utah	10,000
Chemical Plants Corp. Tixan, Ecuador	10,000
Gulf Oil Co. Waddell, Texas	7,000
Mathieson Chemical Co. Stamps, Ark.	21,000†
Odessa-Sid Richardson Odessa, Texas	7,000
Petroleos Mexicanos Poza Rica, Mex.	10,000†
Phillips Chemical Co. Crane, Texas	17,500
Phillips Chemical Co. Goldsmith, Texas	44,000
Royalite Oil Co. Turner Valley, Canada	10,000
Shell Oil Co. Jumping Pond, Can.	10,000
Stanolind Oil & Gas Co. Slaughter, Texas	14,000
Warren Petroleum Corp. Monument, N. M.	5,200
Consolidated Chemical Industries Baton Rouge, La.	14,000
Hancock Chemical Co. Los Angeles	17,500†
J. L. Parker Madill, Okla.	3,500
Shell Chemical Co. Houston, Texas	13,000
Shell Oil Co. Ltd. Stanlow, England	10,000
Sinclair Refining Co. Marcus Hook, Pa.	7,000
Standard Oil Co. (Ind.) Whiting, Ind.	19,200
Swedish Shale Oil Co. Kvarntorp, Sweden	14,000†
Normetal Mining Corp. Dupuy, Quebec	4,500
Electro Jjemisk Skorovass, Norway	75,000
Aluminum Co. of Canada Ltd. Arvida, Quebec	18,900
American Smelting & Refining San Luis Potosi, Mex.	3,000
Bleiberg Mining Union Ltd. Carynthia, Austria	5,000
Canadian Industries Ltd. Copper Cliff, Ont.	40,000

*Long tons. †Added capacity to an already existing plant.

900,000-ton increase in '52

Free world efforts to increase the supply of sulfur have resulted in more than 900,000 long tons per year of new productive capacity since January 1, 1952. This tonnage represents 28 projects in eight nations. The United States ranks first, with 16 projects accounting for estimated production of approximately 700,000 tons. Canada is second with five for about 84,000 tons, and Mexico third with two for 13,000 tons. Single projects are listed for Norway, 75,000 tons; Sweden, 14,000 tons; Ecuador, 10,000 tons; England, 10,000 tons, and Austria, 5,000 tons.

The most recent projects to be placed in production are those of Freeport at Bay Ste. Elaine in the Louisiana marshlands, a Frasch-process operation in which the mining plant, built on a barge, uses heated sea water as the melting medium; Sinclair Refining Co. at Marcus Hook, Pa., and Shell Chemical Co. at Houston, Texas, for recovery of sulfur from refinery gases; Stanolind Oil & Gas Co. at Slaughter, Texas, for obtaining sulfur from sour natural gas, and Canadian Industries Ltd. at Copper Cliff, Ont., for recovery of sulfur from smelter gas. Mr. Williams has estimated that the combined productive capacity of these projects would result in an additional 4,000,000 long tons of sulfur in all forms by the end of 1955.

Spindletop

Largest of the new undertakings is that of Texas Gulf Sulphur Co. at Spindletop Dome near Beaumont, Texas. Spindletop, the fabulous oil field that made petroleum big business, has an estimated capacity of 400,000 long tons of sulfur per year. Although there are other Frasch-type mines being developed, this and Bay Ste. Elaine are the only new mines completed last year.

Canada's biggest operation is that of Canadian Industries at Copper Cliff, with a capacity of 40,000 tons of sulfur equivalent per year. At Tixan, Ecuador, Chemical Plants Corp. is mining 10,000 tons of sulfur per year from surface

STRAIGHT LINE production of conveying and processing machinery for industry is possible in this new 300,000-square-foot plant recently opened by Link-Belt Co. at Colmar, Pa., 25 miles north of Philadelphia; the plant has an overall length of 880 feet, with overhead bridge cranes in four of five 60-foot bays, where 32-foot clear heights have been provided, as well as in the higher (42-foot clearance) receiving and shipping bays at either end

TAPPI MEMBERS tour the Link-Belt Co. Ewart plant in Indianapolis as one of the field trips during the recent Seventh Annual Engineering Conference in Chicago; those in the picture are (l to r): Ed Olmstead, Eaton-Dikeman Co., Mt. Holly Springs, Pa.; George R. Lydick and George Barker, Beckett Paper Co., Hamilton, Ohio, and Joseph Langfitt, divisional superintendent at the Ewart plant

deposits. The largest new project abroad is that of Electro Kjemisk, which lately began producing the equivalent of 75,000 long tons of sulfur a year at Skorovass, Norway. Swedish Shale Oil Co. is recovering 14,000 more tons of sulfur from refinery gases with an expanded plant at Kvarntorp, Sweden, while Shell Oil Co. Ltd. is recovering 10,000 tons in a similar operation at Stanlow, Eng. India's production is obtained from sulfate minerals at the government fertilizer works at Sindri.

Canada lifts controls

The Canadian federal government has announced the elimination of its control over sulfur, finding that a critical 18-month shortage in the basic industrial chemical has come to an end.

Most of Canada's supplies come from the United States, but various projects are under way in the various provinces to expand domestic supplies and thus ease the dependence on imported stocks. Distribution controls in Canada, as in the U.S., were imposed in June 1951.

Venezuelan Sulphur Corp. plans to construct a sulfur refinery at Carupano, Estado Sucre, at a cost of 5,000,000 bolivars ($15,000,000). The plant will refine sulfur mined from the firm's deposits near El Pilar, which the Venezuelan Mining Association estimates contain 2,000,000 metric tons.

Important Potential Sulfur

developments in the Okoyoks area of southwest Alberta have been forecasted by natural gas experts. Explorations in the region have indicated it to be a possible major wet gas field. The gas there contains more sulfur than in any other area of Canada, it is reported. The field, 20 miles south of Calgary, was discovered by Shell Oil Co. in 1951.

Beckman Constructs Eastern Plant

Beckman Instruments Inc. of South Pasadena, Cal., has started construction on a 20,000-square-foot building in Mountainside, N. J. To be used as eastern sales and service offices for the parent company and as an eastern manufacturing facility for the Beckman subsidiary, Helipot Corp., the plant is to be of brick one story high and will incorporate the latest design features for manufacturing scientific and industrial instruments and precision components. It will be located on a two-acre site. Beckman estimates that more than 150 persons will be employed.

Soda Plant Under Construction in Alberta

Chlorine and caustic soda are to be produced by a plant now under construction at Duvernay, Alta. The $3,500,000 operation is being built by Western Chemicals Ltd. Ultimate daily capacity will be 25 tons of chlorine, 30 tons of caustic soda, and 10 tons of muriatic acid.

Company-owned salt beds beneath the plant site are to be utilized as the raw material source, while natural gas will come from wells drilled by the firm in the immediate vicinity. Natural gas is used to provide the necessary steam for concentrating the caustic soda liquors to commercial strength and will also be the fuel for the gas engines that generate power for electrolysis of the brine.

Electricity for general use and to provide power for compressing and liquefying the chlorine gas for shipment will be produced by steam-driven turbo-generators. Large quantities of water for cooling will come from the North Saskatchewan River via a pumping station with a daily capacity of 5,000,000 gallons.

National Starch Products Opens New Laboratory

New laboratory facilities for an expanded research program have been put into full operation at Plainfield, N.J., by National Starch Products Inc. The development is named in dedication to Alexander Alexander, who founded the firm in 1895.

The Alexander Research Laboratories building is the first structure ever built by the firm exclusively for scientific investigation. The laboratory furniture is steel with built-in equipment and desks. There are special areas for titrations, the analytical balances and distillations. Testing is also done in the heavy-duty room and the constant temperature laboratory. Also provided are a conference room and library. Walls, furniture, and desks are all a matching soft green. The ceiling is acoustical tile.

Allied Notes

The Foxboro Co.,
Foxboro, Mass., has recently acquired new factory facilities for the assembly of control valves at Dallas, Texas.

Research Corp.,
Bound Brook, N.J., manufacturer of Cottrell electrostatic precipitators, has announced the opening of a new divisional office in Pittsburgh. H. L. Richardson is the manager.

Nichols Engineering & Research Corp.,
New York, N.Y., has announced the coming introduction of "important" new methods for conditioning papermaking stocks, involving improved dirt and gas removal. The methods employed are a research development of Consolidated Paper Corp. Ltd. and were to be described in a paper presented to the Technical Section of CPPA at Montreal this month.

American Well Works,
Aurora, Ill., announces the appointment of the following sales representatives: A. Y. McDonald Mfg. Co., Minneapolis, and F. S. Crook Co., St. Louis.

Quaker Rubber Corp.,
division of H. K. Porter Co. Inc., Philadelphia, has announced the installation of two large conveyor belt presses, one 72-inch and one 60-inch, to mark the completion of a $250,000 belt department expansion.

The Permutit Co.
has announced that, coincident with the completion of its 1952 program for doubling the capacity of the Birmingham, N.J., plant for the production of ion exchange resins, it has now placed contracts for further expansion and improvements. These include a new laboratory and pilot plant building to cost approximately $200,000.

Snyder Chemical Corp.,
Bethel, Conn., announces the expansion of its technical service to include a special department for beater addition research, with particular emphasis on phenolic resin-elastomer co-precipitations. Further investigations are scheduled for the applications involving the use of beater addition resins with nitrile, Neoprene, GR-S, polyvinyl acetate, and natural latices, as well as acrylics.

Sterling Electric Motors Inc.,
Los Angeles, has announced the appointment of the following distributors: Cascade Industrial Supply Inc., Klamath Falls, Ore.; Selma Foundry & Machine Co., Selma, Ala.; W. S. Wilson Corp., New York, N.Y.; Roger Brown Co., El Paso, Texas; Herr Electric Co., Baltimore; Story Electric Motor Repair Co., Little Falls, N.J., and Woodbury & Co., Portland, Ore.

Ernest Payne Corp.,
New York, N. Y., has been appointed eastern distributor for the Como Automatic Spacing Cutter, manufactured by Alvesta Industries of Sweden. At present the Como is produced in three sizes: 31 inches, 36 inches, and 45 inches.

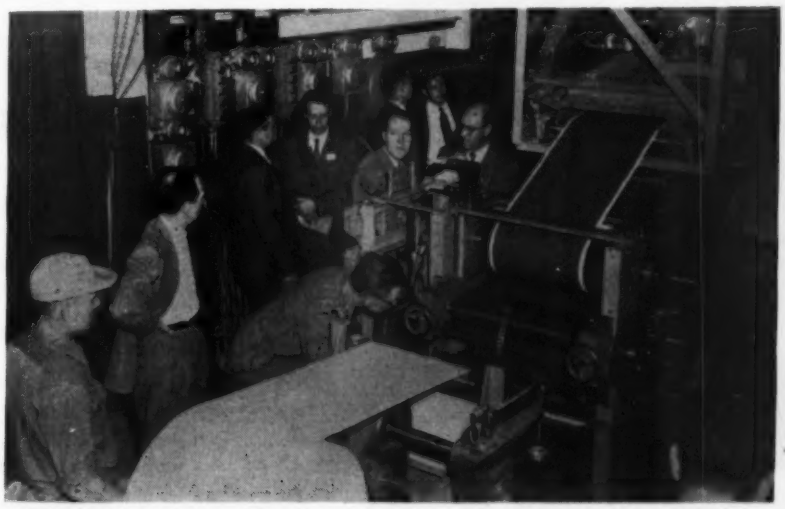
Frank W. Egan & Co.
has added a manufacturing plant to its Bound Brook, N.J., facilities. The increased capacity will be used for manufacturing and assembling Egan machines and equipment for the paper converting and plastics industries.

Warren Steam Pump Co. Inc.,
of Warren, Mass., has appointed J. F. Murray Co. of Baltimore as its representative on industrial sales for the Baltimore area. The region includes most of Maryland and sections of Virginia and West Virginia.

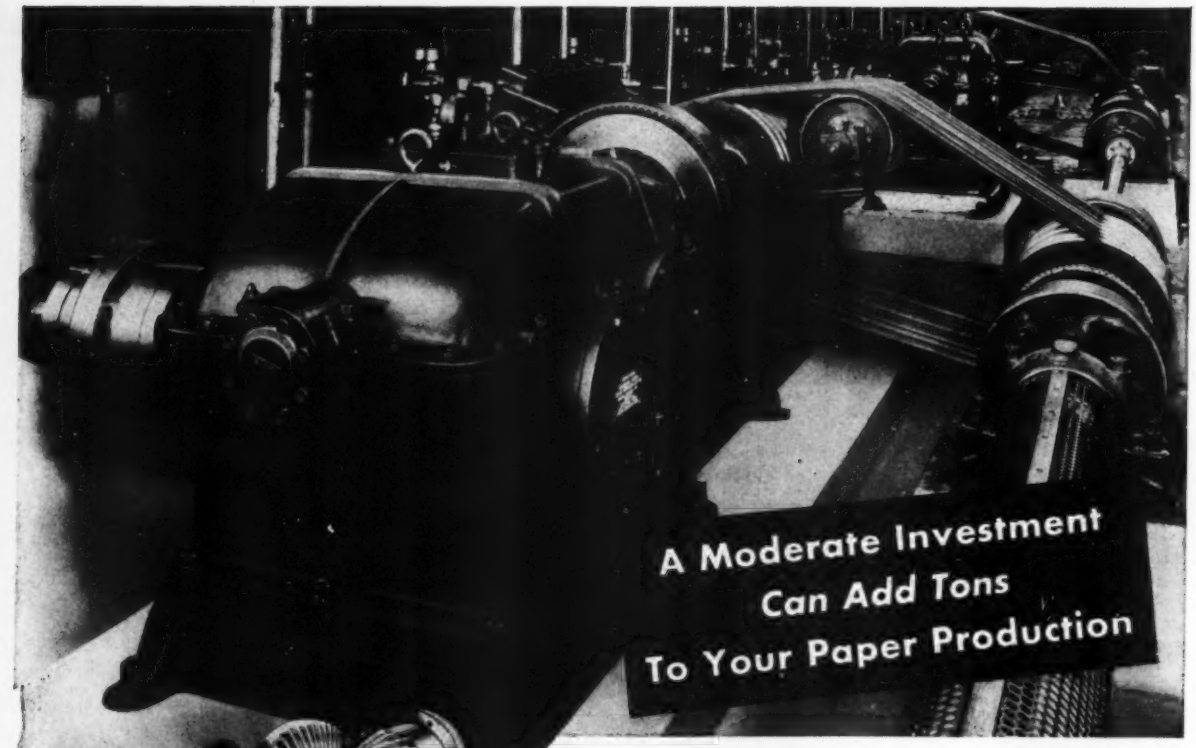
Midland Glue Products Co.,
Ferndale, Mich., has changed its corporate name to Midland Adhesives & Chemical Corp. The firm recently moved to a new 20,000-square foot plant.

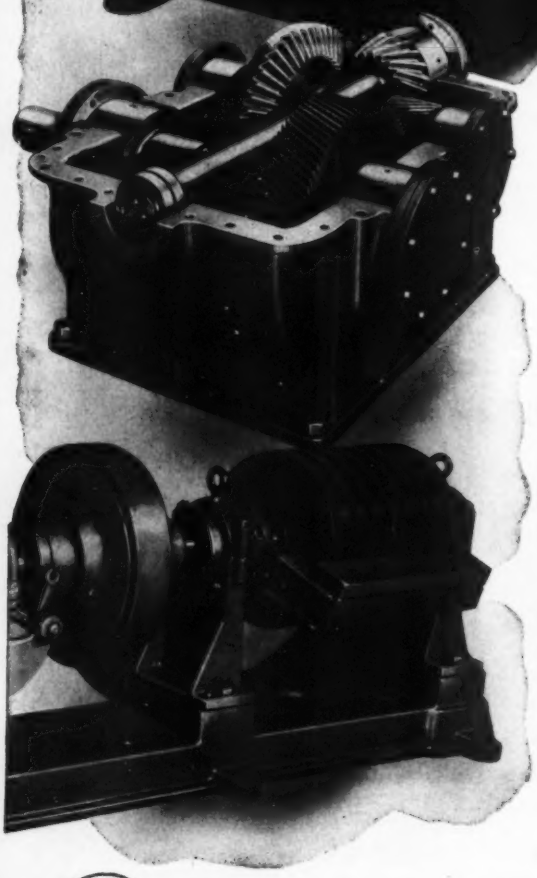
American Cyanamid Co.
has announced the formation of a sales service department for its industrial Chemicals Division. The new department will provide trade records, sales analysis, and complete order processing

OPEN HOUSE was held recently at Santa Rosa, Cal., to mark the opening of Rietz Mfg. Co.'s new plant and offices located on a 50-acre site on the outskirts of the city; above, second from right, Carl A. Rietz, president, explains details of new equipment



SPECIAL TOUR of the new coating laboratory at the plant of Dilts Machine Works in Fulton, N. Y., was a feature of the National Paper and Plastics Conference of Tappi, which was held in Syracuse during November; shown watching the pilot plant Contracoater—reverse roll coater—in action are (l to r): Pete Litwak of Dilts; George Morin of Chicopee Mfg. Co.; John Baymiller of Armstrong Cork Co.; Chester Litwak of Dilts; R. W. Kugler of Dow Chemical Co.; K. A. Arnold of St. Regis Paper Co., and R. J. Jacobs of Dilts; in the rear, the first man is unidentified, while the second is Edward J. Heiser of Dow





The Sandy Hill Selective Drive

All Sandy Hill Selective Drives were installed and started up and are still running without structural or functional failure.

This reflects the attitude of the company's designers in designing adequately for paper machine operating strains. It reflects the Sandy Hill designers' knowledge of paper mill operating conditions which the drives must meet in order to function without failure or annoyance to the user.

Sandy Hill does not build a cheap drive because it believes that a drive which will last over a long period of years with no more attention than adequate inspection and lubrication is the most economical per ton of paper made.

Features

Unvarying draw between sections.

Fineness of draw regulation.

Simplicity of design that keeps maintenance within the ability of the good paper mill millwright.

Power saving and low first cost to a degree hitherto unknown.

No detectable slippage due to the V-belt feature of the drive.

Saving in space, no basement or mezzanine needed for line shaft.

Write on your company letterhead for further information about an adequately designed drive.

The Sandy Hill Iron & Brass Works

Hudson Falls, N.Y.

for the Division's main office in New York, N.Y. Appointed manager of the newly created department was R. C. Sarfaty, who formerly served as product supervisor for the heavy chemicals department.

Heppenstall Co.
Pittsburgh, has appointed Walter L. Potter Co., Johnstown, Pa., as representative for the sale of machine knives for the pulp and paper industry in Pennsylvania and western Maryland.

W. G. Rovang Inc.,
Portland has announced the installation of the first continuous tube mill in the Northwest. The mill will make continuous tubing from 1 to 4 inches in size, with wall thicknesses from 18 gauge to 3/16-inch. Rovang is currently furnishing all pipe, fittings and valves for the new Potlatch pulp mill at Lewiston, Idaho.

Hooker Electrochemical Co.
is opening a new sales office at 1 North LaSalle St., Chicago. Charles Y. Cain, the firm's sales representative in the Chicago area since 1945, has been named district sales manager.

The Babcock & Wilcox Co.'s
Tubular Products Division has moved its Cleveland district sales office to larger facilities. The headquarters are now located in the National City Bank.

Harnischfeger Corp.
has placed on the market its first small model truck crane. Known as the "Miti-Mite," it carries a 25-foot standard length and can handle up to 14,000 pounds lifting capacity. A demonstration was given recently in which the new crane unloaded pulp logs from a truck onto a railroad car.

DR. R. W. MERRITT, assistant vice president of National Starch Products Inc., attended the International Plastics Meeting in Dusseldorf, Germany, in December.

Dr. R. W. Merritt

M. C. McGough

MYLES C. McGOUGH, for the past 15 years associated with Merritt-Chapman & Scott Corp., has become associated with Bechtel Corp., New York, N.Y.

HENRY ARKENS of Menominee, Mich., has been appointed district manager of the Detroit office of Ansul Chemical Co.'s industrial chemicals division.

WILLIAM E. BUCHANAN, president and treasurer of Appleton Wire Works of Appleton, Wis., has been elected to the board of directors of Allis-Chalmers Mfg. Co.

V. B. BODENHEIMER, former area engineer for Riegel Carolina Corp., has joined Stebbins Engineering & Manufacturing Co. as sales and service engineer for the southern states.

V. B. Bodenheimer

H. D. Wake

HERBERT D. WAKE of Green Bay, Wis., has joined E. C. Jacobi in the Midwest representation of The Sandy Hill Iron & Brass Works of Hudson Falls, N.Y., and W. E. Greene Corp. of New York, N.Y.

HUGH S. FERGUSON has been elected president and chief executive officer of Dewey & Almy Chemical Co. He succeeds the retiring Bradley Dewey, who becomes chairman of the board.

B. L. OWENS has been named manager of industrial and mill sales by the Atkins Saw Division of Borg-Warner Corp., Indianapolis.

B. L. Owens

Dr. M. E. Bretschger

DR. MAX E. BRETSCHGER, formerly vice president of Buffalo Electro-Chemical Co. Inc., has been elected president of the company to fill the vacancy created by the death of Charles A. Buerk.

ROLAND H. ("Major") DUFAULT, for the past 20 years manager of the New York district sales office of E. I. duPont's electrochemicals department, retired on January 1.

THOMAS E. MOFFITT has been made western manager of Hooker Electrochemical Co.

A. L. MAGNUSON of the Chicago office of Kelco Co. has been appointed to the position of technical director of the firm's Paper Department.

A. L. Magnuson

W. O. Hisey

W. O. HISEY, vice president and a member of the board of directors of The Sandy Hill Iron & Brass Works, was to serve in a technical consulting capacity at a meeting in Rome early in December of the Food and Agricultural Organization of the United Nations.

HARRY I. HANSEN has been appointed manager of the Detroit district sales office of the electrochemicals department of E. I. duPont de Nemours & Co.

RICHARD F. V. STANTON of West Hartford, Conn., has been elected president of Whitney Chain Co.

R. F. V. Stanton

Robt. McCarron

ROBERT McCARRON, a graduate of the Institute of Paper Chemistry and at one time chief chemist for Escanaba Paper Co., has joined Morningstar, Nicol Inc. as a technical sales and service representative. His territory will include New England, New York, the Atlantic states, and Ohio.

FRED W. FRALEY, a vice president of Diamond Alkali Co. who has been on loan to the NPA, has returned to his post with Diamond. Recent Diamond appointments include *JUSTUS U. BELVILLE,* who becomes staff assistant to

J. C. Forsyth, manager of Alkali specialty sales at the Cleveland headquarters, and *KEMBLE S. LEWIS*, who becomes assistant manager of the Chicago branch sales office.

HUBERT J. McCORMICK has been appointed sales manager of the Caldwell plant of Link-Belt Co. in Chicago, succeeding Erwin A. Wendell, currently on leave.

MILTON J. MAGUIRE, district manager of the Paper Makers Chemical Department of Hercules Powder Co., Portland, Ore., retired December 31. He was to be succeeded by *HOKE MARTIN*, manager of the Kalamazoo sales office.

JOHN C. TYLER has been named southern regional manager for Insul-Mastic Corp. of America. His headquarters are at Houston, Texas.

D. BRUCE ERVIN, for the past two years in engineering design and service, has been added to the sales department of J. O. Ross Engineering Corp. His territory includes Pennsylvania, New Jersey, Delaware, Maryland, Virginia, and West Virginia.

Minneapolis-Honeywell Regulator Co. has named *FRED B. AKERSON* industrial manager of the Portland, Ore., regional office, and *JAMES E. VANDERVELD* has been appointed industrial sales manager of the same office.

WILBERT G. PRASSE has been elected president of The Oilgear Co. of Milwaukee to succeed the late George H. Fobian. Mr. Prasse joined Oilgear in 1927.

Reichhold Chemicals Inc. has appointed *ARCHIE H. DEAN* as sales manager of the newly formed Specialty Products Division and *DONALD G. PATTERSON* as technical assistant on resins and plastics to Henry H. Reichhold, chairman of the board.

Reliance Electric & Engineering Co., Cleveland, has named *WILLIAM C. McCONNELL* to head A-c motor sales; *ROBERT B. REED* as sales engineer in Detroit, and *REX T. WILLARD* as sales engineer in Birmingham, Ala.

R. A. JOHNSON has been made Atlanta district sales manager for the Meter and Valve Div. of Rockwell Mfg. Co., Pittsburgh.

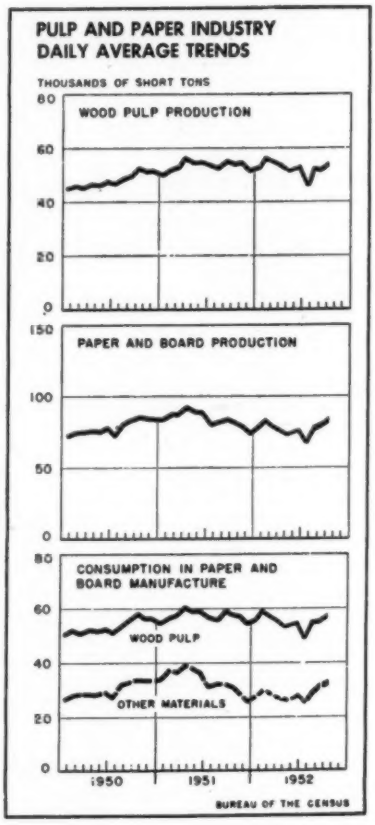
U. S. Paper and Paperboard Production

	Oct. 1952 (tons)	Sept. 1952 (tons)	Oct. 1951 (tons)	Total 1951* (1,000 tons)	Total 1946
Paper and Board, total	2,279,212	2,027,431	2,219,408	26,086	19,278
Paper, total	946,190	845,449	1,044,127	11,622	8,752
Newsprint	94,302	89,016	98,054	1,106	773
Groundwood paper (uncoated)	70,018	62,997	74,119	789	776
Printing and converting (coated)	95,040	80,794	96,131	1,115	486
Book paper (uncoated)	128,685	113,130	142,937	1,622	1,447
Fine paper (writing, cover and text, bristols, thin paper, and other)	111,288	100,268	123,623	1,364	1,160
Coarse paper (unbleached, kraft, glassine, greaseproof, vegetable parchment, and other)	273,935	245,051	323,920	3,597	2,690
Special industrial paper	29,192	32,188	38,749	419	272
Sanitary paper	110,524	94,675	114,936	1,215	861
Tissue paper	20,478	18,315	21,578	270	184
Absorbent paper	12,728	9,015	10,080	124	103
Paperboard, total	1,061,651	928,797	929,777	11,605	8,396
Containerboard, total	569,582	492,940	513,198	6,347	4,315
Liners	393,394	337,251	347,869	4,205	
Corrugating material	152,887	132,503	144.855	1,815	
Container chip	23,301	23,186	20,474	328	
Bending board (folding boxboard)	307,848	273,323	260,049	2,429	2,317
Non-bending board (set-up boxboard)	81,760	70,548	63,279	701	521
Cardboard	6,856	6,109	6,744	79	89
All other paperboard	95,605	85,877	86,507	2,049	1,154†
Wet machine board	13,546	12,104	11,329	144	138
Construction paper and board, total	257,825	241,081	234,175	2,716	1,992
Building paper and insulation	133,733	123,366	121,876	1,401	1,036
Hardboard and insulating board	124,092	117,715	112,299	1,315	956

(*) Preliminary report. (†) Includes bending board and non-bending board not for use in box plants. *Source: U. S. Department of Commerce.*

October Pulp, Paper and Board Production

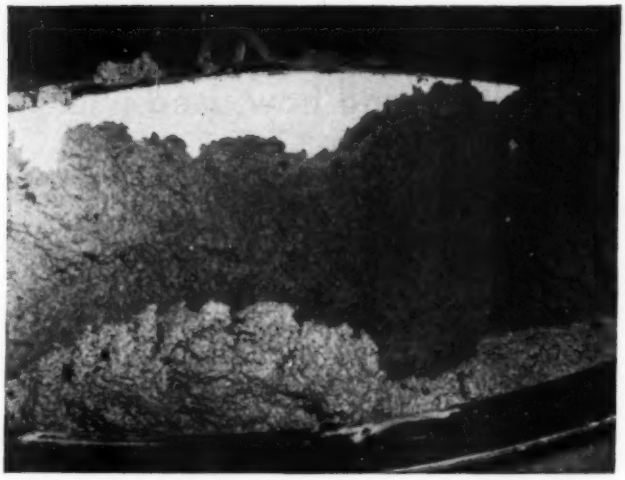
Paper and board production during October amounted to 2,279,212 tons, according to a report released by the Bureau of the Census. This is about a 3 per cent increase over the tonnage produced in October a year ago. In terms of production base capacity, the industry operated at 78.3 per cent in October, with the paper and paperboard sections operating at 78.3 and 77.8 per cent, respectively. The comparable ratios for September were: Total, 75.4 per cent; paper, 75.7 per cent, and paperboard, 73.7 per cent.



Pulpwood receipts at the pulp mills during October amounted to 2,273,436 cords, with consumption at 2,351,014 cords. Month-end inventories decreased slightly to 5,936,124 cords.

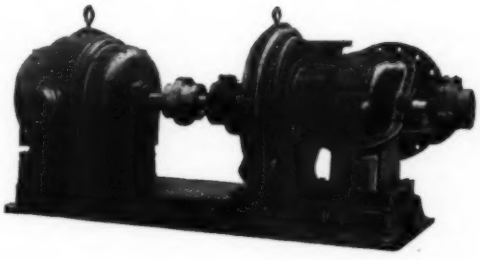
Wood pulp production during the month amounted to 1,471,015 tons. In terms of production base capacity, pulp production ran at 82.2 per cent, as compared with 79.7 per cent in September.

Wood pulp inventories at the end of October at the paper and board mills were 518,216 tons, as compared to 517,475 tons reported at the end of September. Month-end stocks at the pulp mills increased slightly to 139,522 tons.



Takes a Shartle HMSS to pump this.

Custom Built Centrifugal Pumps for any Paper Mill Application



HMSS high density pump.

Require a pump capable of pumping extra high density stock—up to 11%? That is where the Shartle-Miami* Class HMSS qualifies. Custom built.

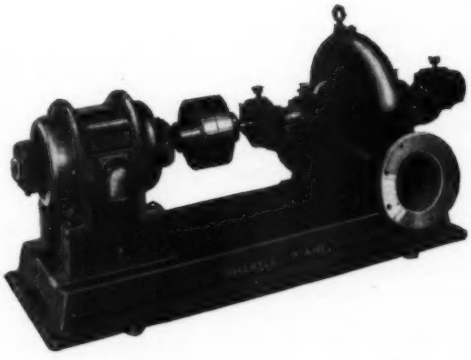
Need a pump to handle water, white water or thin stock? That's the function of the Shartle-Miami Class A. Also custom built.

In short, the Shartle-Miami line of pumps is surprisingly complete—everything, and in all the required capacities—even vertical designs for cramped locations or basements subject to flooding. They're all custom built.

Also Shartle-Miami plunger pumps and custom built agitator equipment.

Shartle—specialists on pumping and agitation.

*Trade Mark



Class A water and white water pump

SHARTLE

Shartle Bros. Machine Company • Middletown, Ohio

DILTS MACHINE WORKS, Fulton, New York • Divisions of THE BLACK-CLAWSON COMPANY, Hamilton, Ohio
Subsidiary: B-C INTERNATIONAL, LTD., London S. W. 1, England • Associate: THE ALEXANDER FLECK LIMITED, Ottawa, Canada
Western Sales Office: Mayer Bldg., Portland, Oregon • Southern Sales Office: 685 W. Peachtree Street, N. E., Atlanta 3, Ga.
Northeastern Sales Office: Dilts Machine Works Div., Fulton, N. Y. • Northern Sales Office: 814 N. Superior St., Appleton, Wisc.

Job evaluation . . .

—what it is, how implemented, and how used

. JOHN J. BUTLER*

Part I of a series

Job evaluation is a sound and rational way of insuring better management-labor relations. This introductory article, the first of a series, will be followed by others dealing with various aspects and specific applications of job evaluation in the pulp and paper industry.

INEQUITIES in pay are among the most common sources of employee dissatisfaction in industry today, and a fair compensation plan is an essential ingredient in every modern labor relations program. To feel that he is paid fairly, the worker expects his pay to be:

(1) In proper relation to what is paid others on the same or similar jobs;

(2) Fair in comparison to what is paid other employees on both more and less difficult and responsible jobs;

(3) Favorable in comparison to the general level in the industry and the community.

A sound compensation plan meets all these requirements. To set up such a plan, however, requires that the worth of each job in the organization be measured accurately and realistically. This process of job measurement is called job evaluation.

There is no exact scientific formula for classifying jobs and establishing wage rates. Job evaluation, however, is a method which provides a systematic and orderly approach to the problem by setting up an equitable and defensible pay scale.

Job evaluations of some kind are made every day. Every employer is faced with the problem of determining how much the office boy should be paid in relation to the stenographer, or how much the laborer should receive as compared to the machine tender. In the past such determinations were based on personal judgment; hence, although they were accurate within reasonable limits, they were not defensible and did not provide any basis for a real compensation plan.

Advantages of systematic job evaluation

A formal job evaluation plan has the following major advantages over "rule-of-thumb" methods:

(1) Personal opinions are replaced by objective judgment; (2) jobs are analyzed in relation to their requirements; not on the basis of personalities; (3) job evaluation provides a specific description and an outline of the specifications of the job, and (4) there is a clear record of the duties, responsibilities and requirements of each job; this record is used in setting wages and as a basis for the actual wage structure.

Policies to be considered

Job evaluation should be considered as a tool of management. Before any job evaluation plan is undertaken, company management should consider its policies carefully:

(1) Who is to be responsible for the program? (2) What level company wages are to be in relation to other companies? (3) What action is to be taken when individual salaries are above or below the proper levels? Only when these questions and decisions have been carefully thought through should the actual process of job evaluation begin.

Steps in a job evaluation program

Every job evaluation program, whether for office jobs, shop jobs, mill jobs, or supervisory jobs, involves certain basic steps. These steps and how they are carried out may vary with the company situation, union participation, and with the types of jobs to be covered. However, the principal steps are the same.

(1) Set up the basic policies for the job evaluation and its uses.

(2) Obtain an accurate, complete description for every job to be covered.

(3) Select the job evaluation plan to be used. There are several basic job evaluation plans; however, all involve: (a) selecting requirements, such as education, experience, skill, working conditions, which are common to the job and which can be measured; (b) analyzing each job in terms of these factors; (c) arriving at a total "worth" for each job, and (d) comparing job worths to obtain relationships for compensation purposes.

(4) Rate the jobs according to the plan selected—ratings should involve job requirements, not the people on the job.

Use of job evaluation

After the jobs are evaluated and ratings have been checked, the relationships arrived at should be developed into a wage structure, considering:

1. Levels of jobs evaluated.
2. Area and industry pay practices.
3. Room for rate increases and promotion.
4. Simplicity for payroll purposes.

Where union contracts or rates are involved, these must of course be considered or dealt with. In many cases a systematic job evaluation is of great assistance in union discussions since it provides management with a factual basis for wage recommendations.

In installing a wage structure based on job evaluation, individual employees whose rates are out of line must be treated fairly. Employees paid below established minimums should be raised to the minimums; on the other hand, employees receiving above maximums should be moved, where possible, to a job justifying the high rate.

Maintenance of the job evaluation plan

Job evaluation is not done once and forgotten. Jobs change; new jobs are set up; jobs are combined and dropped. Job descriptions must be audited and checked to see that they reflect the work as it is really being performed. Salary and wage records must be maintained accurately.

A compensation plan based on fair, methodical comparisons between jobs—arrived at through job evaluation—can be the first step in a progressive and effective program of personnel administration. In the paper industry, where traditions and precedent have had such a great effect over the years, the advantages of job evaluation—as one means for good employee relations—may far outweigh the cost.

*Treasurer, George Fry & Associates, consulting management engineers, Chicago and New York, N.Y.

The chemistry of the cellulosic wood fiber

LOUIS E. WISE and M. A. BUCHANAN
The Institute of Paper Chemistry

UNDER THE MICROSCOPE the seed hairs of the cotton plant can be distinguished readily from the individual botanical elements of wood. The flat twisted ribbon of cotton shows little resemblance morphologically to the individual fibers, the rays, or to the vessels of an angiosperm (like aspen or gum) or to the tracheids of a pinewood. There are fundamental chemical differences as well, and it is some of these that will be discussed in this paper.

In the main, wood can be separated superficially into two types of components—those which are soluble in water or neutral solvents, and those which are not. Solutes of the first type are termed the extractives or extraneous substances. These lend to the wood such properties as color, odor, durability, etc. The number of these compounds is legion. They include the oils, resins, sterols, coloring matters, tannins, starches, sugars, cyclitols, alkaloids, proteins, and certain mineral components, but this does not exhaust the list. Compounds of the second type—those which are insoluble in neutral solvents—are actually a part of the cell walls of the wood. In the main, they include the carbohydrates —cellulose and the hemicelluloses—and the noncarbohydrate material—lignin.

Holocellulose, cellulose, hemicelluloses

When finely divided, extractive-free wood is treated alternately in the cold with moist chlorine and alcoholic ethanolamine, the lignin is changed, and most of it enters into solution (1). A similar effect is obtained when chlorination is carried out in ice-cold carbon tetrachloride (2), or when the wood is treated with aqueous acetic acid and sodium chlorite (3). The treatment is termed *delignification,* and the insoluble white or nearly white residue is called *holocellulose.* This fraction contains all the cellulose and nearly all the hemicelluloses of the original wood. Holocellulose is an interpenetrating system of high polymers.

If cotton is similarly treated with chlorite, there is no so such obvious change because, after thorough extraction (with neutral solvents), cotton fiber contains little hemicellulose and because lignin is absent from the very start. Wood holocellulose, then, consists of cellulose and hemicelluloses.

If holocellulose is extracted cautiously with aqueous alkali, preferably with potassium hydroxide under purified nitrogen, most of the hemicelluloses enter into solution. Provided this alkaline treatment is continued a number of times (with increasing concentrations of alkali), practically no more material is dissolved (4). The insoluble fibrous material is then *wood cellulose* (or what may be termed *alpha-cellulose*).

By cautiously acidifying the alkaline solution with acetic acid and then adding alcohol, a flocculent precipitate is formed. This is the hemicellulose of the wood — somewhat modified chemically, but retaining many of the chemical characteristics of the original cell-wall material. These amorphous hemicelluloses are then hydrolyzable by dilute mineral acids and yield various sugars and their derivatives, which will be discussed later.

At this point a note of warning should be sounded. Our definition of wood cellulose and wood hemicelluloses is contingent on how the latter were extracted. Somewhat different results are obtained if the extraction is carried out over long or short time periods, if the concentration of alkali is varied and if the extraction temperatures are changed. Furthermore, the fineness of division of the original wood from which the holocellulose was prepared has a bearing on the question. For example, wood shavings or wood chips may give results different from those obtained with wood meal, which presents a greater surface to the reagents (5). Hence, there is no precise sharp dividing line between cellulose and the hemicelluloses.

Hemicelluloses (especially those of the hardwoods) may also be extracted directly from the original (extractive-free) wood by means of alkali. Often this type of alkaline extraction is far from quantitative, but it has the advantage of preventing undue oxidation and chain fission (especially if nitrogen is used). On the other hand, such preparations may be contaminated with lignin.

The technique of direct alkaline extraction was used by pioneering workers like O'Dwyer and Anderson, and these preparations served in focusing on the chemical architecture—especially of the hardwood hemicelluloses. Within recent years many, but far from all, investigators have first prepared holocellulose, and then hemicelluloses.

Correlation between hemicelluloses and acetyl groups

Wood also contains appreciable amounts of acetyl groups. These are, of course, removed by saponification when the hemicelluloses are isolated by alkali. We mention them here because it appears that these acetyl groups are associated with the hemicelluloses. There are various pieces of indirect evidence for this. For example, when holocellulose is prepared by chlorination and ethanolamine extraction, most of the acetyl groups are retained by the holocellulose. This would indicate that they are present either in the cellulose and/or in the hemicelluloses. Analyses of various woods indicate that those woods that are low in hemicelluloses are also low in acetyl groups and those that are high in hemicellulose are high in acetyl (4). For example, extractive-free Douglas fir containing 14.1 per cent hemicelluloses contained 0.61 per cent acetyl. Black spruce containing 17.4 per cent hemicellulose contained 1.12 per cent acetyl. A southern oak which contained 23.3 per cent hemicelluloses held 3.3 per cent acetyl. This correlation is far from perfect, but it shows a definite trend, and one which we have found in a series of wood analyses.

Somewhat different evidence has recently been presented by Jones (6) with regard to the possible relationship between hemicelluloses (especially those high in xylose units) and acetyl groups. If a carbohydrate contains neighboring (=vicinal) free hydroxyl groups (i.e., 1, 2-diols) and is treated with sodium periodate at 2°C., the sugar units are oxidized and cannot be recovered. When, however, one of these hydroxyl groups is covered by an acetyl group (or in fact any other group), oxidation at this point is prevented and, after hydrolysis, the sugar is recovered. This is indicated schematically in Figure 1.

In the case of an aspen wood containing acetyl groups which was treated with sodium periodate and then hydrolyzed, almost 75 per cent of the xylose originally present as xylan was recovered unchanged. However, if from this same aspenwood, the hemicelluloses were first isolated with alkali and then treated with periodate, only 9 per cent of the xylose units were recovered unchanged, indicating that the alkaline treatment, which removes acetyl groups, had removed them from some of the hydroxyl groups mentioned previously, thus giving rise to new neighboring hydroxyl groups. This would indicate that the acetyls had been linked originally with a part of the xylose units of the wood. A similar hypothesis was formulated years ago by Erich Schmidt (7).

Wood cellulose

The residual wood cellulose (or alpha-cellulose) is never quite identical

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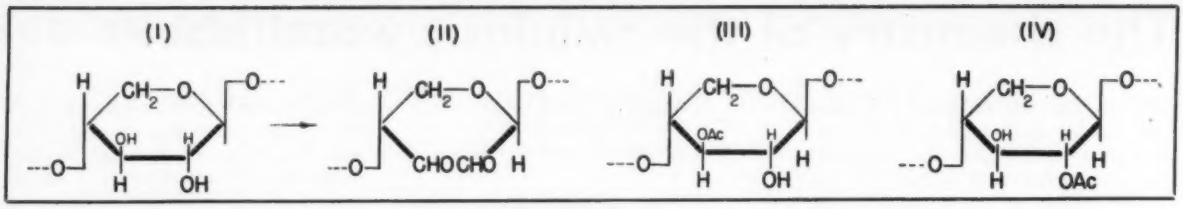

Figure 1 HIO_4 converts (I) into (II) but does not change (III) or (IV).

chemically with purified cotton cellulose. When cotton cellulose is hydrolyzed completely, the only simple sugar obtained is D-glucose. When wood cellulose is hydrolyzed, glucose is also the principal sugar. However, in the case of coniferous wood celluloses, appreciable amounts of mannose and often small amounts of xylose are also present among the hydrolysis products. In the case of celluloses from hardwoods, small amounts of mannose may also be formed, and varying amounts of xylose are present. To the best of our knowledge, no alpha-cellulose from wood holocellulose has been prepared that is absolutely free from sugar units other than glucose. In this way, cotton and wood cellulose are different, but in most respects they are chemically similar. Both give a similar triacetate. On acetolysis both give high yields of cellobiose octoacetate. Both form similar cellulose nitrates. Both show similar rotations in cuprammonium hydroxide under standardized conditions. Both show similar x-ray diagrams. But they are not identical (8).

The non-identity of cotton and wood celluloses is shown by the work of John Leech (9), who studied the acetolysis products of slash pine cellulose by chromatographic methods. The original alpha-cellulose fraction contained over 10 per cent mannan. The acetolysis products which he obtained included the well-known acetates of glucose, cellobiose, and cellotriose (which are also formed from cotton). However, the mother liquors from these indicated that a disaccharide containing both glucose and mannose units was also at hand. Unfortunately, the amounts were too small for complete study, and the recognition of the sugar units (after hydrolysis) depended on paper partition chromatography. Most of the mannose fractions were contained either in the acetylated cello-dextrins or were isolated as the simple sugar—mannose. In a measure, Leech's work supplemented the studies of Wise and Ratliff (8), who also showed that a part of the mannose units in pine alpha-cellulose were extremely resistant to repeated hydrolysis with 5 per cent sulfuric acid. After eight such one-hour hydrolyses, a typical hydrocellulose resulted—a veritable gel, which still retained over 55 per cent of the mannan present in the original alpha-cellulose. Thus, it becomes evident that mannose units are removed with difficulty from what we term alpha-cellulose of conifers. Isolated examples also show the persistence of pentose units in the alpha-cellulose from hardwoods (5, 10).

What we have said has to do with wood alpha-cellulose derived from holocellulose. The picture changes quantitatively when we deal with chemical pulps. Here the cooking operation has removed a large part of the hemicelluloses of the wood, and it may have so modified the cellulose that its physical properties approach those of the hemicelluloses. If we examine the alpha-cellulose of a kraft pine pulp, the mannan content will be considerably lower than that of an alpha-cellulose from the holocellulose made directly from the wood. These respective mannan contents may be about 5 to 6 per cent in the former and 10 to 12 per cent in the latter (11).

March (24) found that the xylan content of an alpha-cellulose from a bleached aspen kraft pulp is ordinarily much higher than that in the corresponding alpha-cellulose from an aspen chlorite holocellulose. This seeming paradox was explored thoroughly by Schoettler (5). Whereas holocellulose was extracted with potassium hydroxide to give the alpha-cellulose, the kraft pulp had been formed by the use of caustic soda. Potassium hydroxide often removes more xylan than does sodium hydroxide. Much of the added removal of xylan from holocellulose, however, could be ascribed to the fineness of division of the aspen wood meal (over that of the wood chips). Furthermore, the temperature and the length of chloriting also had a marked effect on the amount of xylan that remained in the alpha-cellulose. Schoettler's work emphasizes again the difficulty in finding a sharp line of demarcation between cellulose and hemicelluloses.

Recent advances in hemicelluloses

Let us return now to the hemicelluloses and explore some of the more recent advances in this field. These are the polysaccharides that can be extracted with alkali, preferably in the absence of air, which can be flocked out by acidifying and treating with alcohol, and which are much more readily hydrolyzed by acids than is cellulose. Inasmuch as potassium acetate is more soluble in alcohol than is sodium acetate, potassium hydroxide is often used in extracting hemicelluloses, rather than sodium hydroxide. Isolated hemicelluloses still retain potassium in large measure because of the uronic acid groups in the hemicelluloses. The so-called polyuronic acids are stronger than is acetic and form potassium salts. However, if the impure hemicelluloses are dissolved in very dilute potassium hydroxide, or suspended in water, and then treated with cold (very dilute) HCl and with alcohol, they can be recovered almost quantitatively and their ash content is greatly reduced. A similar, but more troublesome, purification can also be accomplished by electrodialysis.

Molecular magnitude of wood hemicelluloses

Within the past few years, the molecular magnitude of wood hemicelluloses has been widely explored. Provided care was exercised in forming the original holocellulose, the number average degree of polymerization is surprisingly constant. It is 155±15 per cent. This average figure holds for beech, spruce, and aspen and, presumably, also for birch hemicellulose. Elm hemicelluloses (more drastically treated) fell within the D.P. range of 100-120. These results were obtained both from viscosity measurements on dilute solutions in 10 per cent KOH and from osmotic pressure measurements made on solutions of appropriate esters. Investigators who have made notable contributions in this field

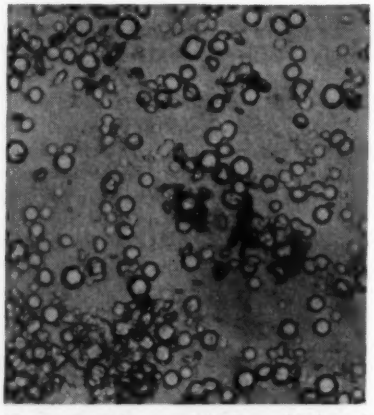

Figure 2 Xylan crystals from birchwood (Yundt).

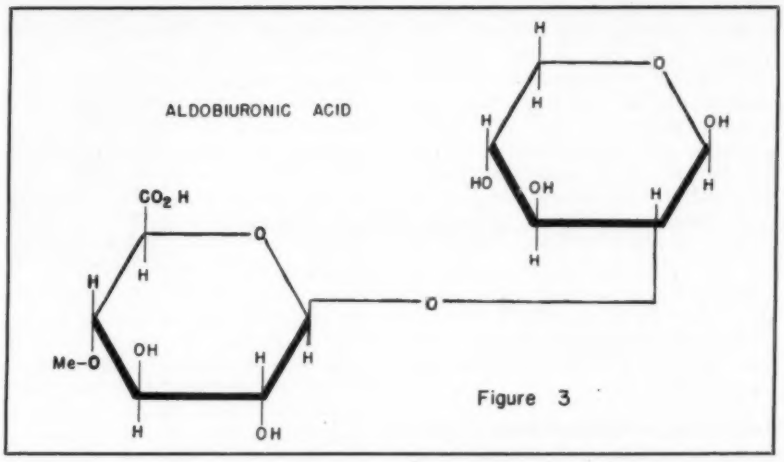

Figure 3

include Millett and Stamm (12), Wethern (13), Husemann (14), Timell and Jahn (15) and Thompson (16). It should be emphasized, however, that the chemical and physical heterogeneity of the hemicelluloses has been established experimentally, especially in the case of spruce (13). Here the fractionation of the butyrates from acetone yielded products with D.P.'s ranging from 50 to 300. Fractional precipitation of spruce hemicelluloses gave products the pentosan content of which ranged from 30 to 57 per cent.

It is evident that the molecular magnitude of the hemicelluloses is different from that of wood cellulose, the average D.P. of which may be well over 2000.

Treatment of any type with warm mineral acids causes rapid cleavage of hemicelluloses, and degradation also occurs on extensive chloriting of wood even at pH 4 to 4.5. When holocellulose yields are unusually low [as in the case of Millett and Stamm (12)], the D.P.'s of the resulting hemicellulose fractions have also decreased materially. For this reason the mildest treatment should always be used in preparing holocelluloses, when the D.P. of a hemicellulose is to be determined subsequently. The technique proposed by Wethern [who modified that of Thomas (2)] appears to be generally satisfactory.

Briefly, Wethern treated the extractive-free moist wood at 0°C. with chlorine in carbon tetrachloride. The resulting suspension, cooled in a freezing mixture, was stirred well for five minutes and then filtered and washed promptly with alcoholic ethanolamine. Chlorination and ethanolamine treatments were repeated about five times and the final product was washed with 50 per cent alcohol. From this holocellulose preparation, the hemicelluloses were isolated.

Can homogeneous hemicellulose fractions be prepared?

The question may be raised: "Has any homogeneous hemicellulose fraction ever been prepared—in which only one type of sugar unit is present?" At this time it is difficult to give a categorical answer. Yundt (17) appears to have come as close to this objective as anyone, and in so doing, he certainly prepared a degraded fragment of the hemicelluloses. Yundt extracted the hemicelluloses from barley straw and from birchwood holocellulose. These preparations were hydrolyzed partially and carefully with 0.5 per cent oxalic acid, and the insoluble portion was then autoclaved at 120°C. with a large excess of water, in which it formed a 0.2 per cent solution. When this solution was cooled very gradually to 60-70°C., hexagonal plates separated (Figure 2). These gave a characteristic x-ray diagram and, on complete hydrolysis, yielded xylose almost quantitatively. When the crystalline material was methylated and subjected to osmotic pressure measurements, it showed a D.P. of 39. This same D.P. was obtained by the use of a specially devised end-group method. This appears to be the first time that a crystalline fragment of relatively high and definite molecular weight has been isolated. The crystals contained the beta-1, 4-linkage analogous to that found in cellulose and was similar to the xylan isolated from esparto pulp (18).

Another investigator who isolated what appears to be a true xylan (an amorphous one, however) was Schoettler (5). He prepared a kraft aspen pulp, which was then converted into an alpha-cellulose by means of strong sodium hydroxide. This fibrous residue was then extracted with potassium hydroxide. This solution was acidified with acetic acid and precipitated with alcohol. The precipitate when hydrolyzed gave only xylose. Paper chromatographic analysis indicated that no other sugars were present.

Hardwood hemicelluloses

In hardwood hemicelluloses, xylose is the dominant sugar unit, but it is never the only unit. Invariably it is linked with small amounts of a uronic acid group—a glucuronic acid in which an ether methoxy group is present. One of the products of hemicellulose hydrolysis (in the case of hardwoods) is an aldobiuronic acid containing one methoxyl group. This is exceedingly difficult to hydrolyze without complete degradation. In the case of aspen (19) it appears to have the structure given in Figure 3.

Besides this there is the evidence deduced by Yundt (17) that, in birch hemicellulose, there may be as many as 35 xylose units linked together (largely through positions 1 and 4). In addition, there is absolute proof that three of these (in aspen hemicellulose) are linked in this way, because xylotriose (6, 20) (Figure 4) was definitely identified on partial hydrolysis. How this aldobiuronic acid group is attached to the main xylose chain is still unsettled, but there is some evidence that it forms a branch which is attached to the main chain of xylose units.

Other sugar units are also present in the hemicelluloses. Thus, we know that extractive-free aspen, when partially hydrolyzed, gives not only xylose and the aldobiuronic acid but also small amounts of arabinose, galactose, and rhamnose (6), and one investigator has also reported the probable presence of very small amounts of mannose and glucose. Just how these other sugar units fit into the hemicellulose picture is unknown. All of them (in the case of hardwoods) are subordinate to xylose, and they may be present in a series of polysaccharides, or they may form units in a large molecule. At present we have no criteria for judgment. As Jones has said (5) "the problem is . . . compli-

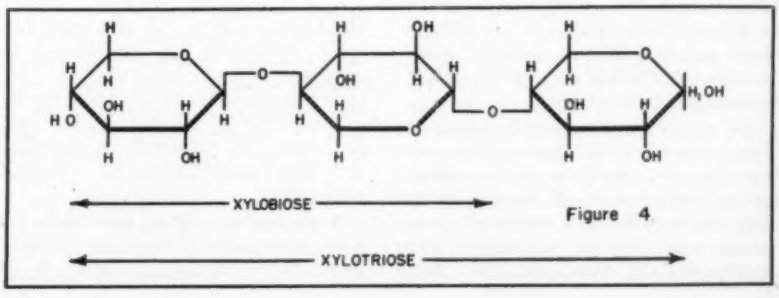

Figure 4

cated by the fact that the composition of the polysaccharides may alter with the age of the tree and vary in different parts of the wood as, for example, the sapwood and heartwood of oak (O'Dwyer)".

Hemicelluloses of coniferous woods

The hemicelluloses of the coniferous woods have been explored even less fully than have those of the angiosperms. In certain coniferous hemicellulose fractions, xylose units still predominate, but mannose units are always in evidence, and often their amounts are appreciable. For example, a slash pine holocellulose, when extracted with 5 per cent potassium hydroxide, gave a hemicellulose containing 11.5 per cent mannan. When the fibrous residue was then extracted further with 16 per cent potassium hydroxide, a hemicellulose fraction was isolated that contained 27 per cent mannan. With 24 per cent potassium hydroxide, a small hemicellulose fraction was obtained that contained 45 per cent mannan. Very similar results were obtained with hemicellulose fractions from spruce. How these mannose units are linked together is still a mystery. That other sugars are also found in the hydrolysis of spruce hemicellulose was shown by Wethern (13), who found that glucose and/or galactose were also present in quantity. Hemicelluloses from Douglas fir in addition to mannose and xylose units also contain glucose and galactose residues (21). Pine kraft pulps contain small amounts of arabinose and galactose residues, which are certainly a part of the retained hemicelluloses. Of the uronic (or aldobionic) acids in the coniferous woods we have relatively little information, and this field should be explored.

There is one type of uronic acid residue which is found in wood, but which is not part and parcel of the hemicellulose system. We refer to the pectic material, which is present in small amounts and which contaminates many holocellulose preparations (especially in the hardwoods). The isolation of relatively pure pectic material is extremely difficult, but laborious separations have been made by Anderson (22), both from hardwoods and softwoods. Ordinarily the rotations of hemicelluloses (with a few exceptions) are negative. On the other hand, pectic acid from wood shows a high positive rotation $[\alpha]_D$+200° or more and, on hydrolysis, furnishes galacturonic acid (which is not given by the hemicelluloses themselves).

Before leaving the chemistry of wood fibers, we must allude again to their nonhomogeneity—arrived at by some interesting experiments. If a coniferous bleached sulfite pulp (containing about 6 per cent mannan) is treated with cuprammonium hydroxide, the fibers balloon and swell and there appear constrictions between these balloons. The balloons burst and go into solution gradually, but the constrictions form an insoluble "debris." Actually, this is the insoluble copper complex of a polysaccharide and represents only 2-3 per cent (or less) of the pulp. When this is decopperized, the carbohydrate can be isolated and purified. On hydrolysis, this material is shown to contain about 70 per cent mannose; the rest is glucose, with possibly small amounts of uronic acid. Thus, we have evidence that the outer layers of these fibers are chemically different in composition from that of the over-all pulp.

Importance of hemicelluloses in pulps

The importance of hemicelluloses in pulps that are to be used in papermaking has been treated admirably by Cottrall (23). Wood pulps from which hemicelluloses have been almost completely removed do not form strong sheets of paper. There is increasing evidence, however, that an optimal hemicellulose range exists within which a pulp furnishes the strongest sheet. This range will vary with different woods and different types of pulp. Up to a certain point, the bursting and tensile strengths of a sheet increase with increasing hemicellulose content. In the case of bleached sulfite beechwood pulps, Jayme and Lochmueller-Kerler (25) found that the strength reaches a maximum with rising hemicellulose content and then drops. They found that the maximum "over-all strength" (a mathematical formulation which combines breaking length, burst, folding endurance, and tear resistance of the sheet) was found at pulp yields of 50-52 per cent. This pulp then contained about 18 per cent hemicelluloses. However, individual strength properties showed their highest values in different yield ranges. For example, the maximum tensile strength was found at a pulp yield of 53 per cent and the maximum tear at 47 per cent. Thus the over-all strength value is a compromise.

The data of Jayme were complemented and confirmed by March (24), who used aspen holocellulose; and by Ratliff (11), who worked with kraft pulps prepared under varying cooking conditions.

If, as is frequently the case, chemical wood pulps are to be converted into rayon, cellophane, cellulose acetate, or cellulose ethers, hemicelluloses are highly undesirable and must be removed as completely as possible. Under these conditions, an alpha-pulp is prepared, and the hemicelluloses are extracted with alkali.

In the various pulping operations, the more labile hemicelluloses are removed and converted into sugars. Others (in alkaline pulping) give rise to rather complex organic acids. In any event, the degradation products of the hemicelluloses are found in the spent liquors. The sugars formed in this way may serve in the production of ethyl alcohol or as nutrients for the growth of certain yeasts. However, when the products are run into streams, a serious situation may arise. The sugars may lead to a multiplication of micro-organisms, thus depleting the usual oxygen supply of the water. This, in turn, may deprive the fish of their needed air, and death on a large scale may be the result. State agencies, with the cooperation of industry, are taking steps to alleviate these conditions. Spent liquors — especially those from sulfite pulping operations— are being utilized physically, chemically, and biologically.

Literature cited

(1) Van Beckum, W. G., and Ritter, G. J., *Paper Trade J.* 104, no. 19:49 (1937).

(2) Thomas, B. B., *Paper Ind.* 26:374, 1281 (1945).

(3) Wise, L. E., Murphy, M., and D'Addieco, A. A., *Tech. Assoc. Papers,* 29:210 (1946).

(4) Wise, L. E., and Ratliff, E. K., *Ind. Eng. Chem., Anal. Ed.* 19:459 (1947).

(5) Schoettler, James R., A study of alkali resistance of pentosans in aspenwood. Doctor's Dissertation. Appleton, Wis., The Institute of Paper Chemistry, 1952, p. 121.

(6) Jones, J. K. N., and Wise, Louis E., *J. Chem. Soc.* 1952:2750.

(7) Schmidt, E., *et al., Cellulosechem.* 12:201 (1931).

(8) Wise, L. E., and Ratliff, E. K., *Arch. Biochem.* 19:292 (1948).

(9) Leech, J. G., *Tappi* 35:249 (1952).

(10) Wise, L. E., and Russell, W. C., *Ind. Eng. Chem.* 15:815 (1923).

(11) Ratliff, F., *Tappi* 32:357 (1949).

(12) Millett, M. A., and Stamm, A. J., *J. Phys. Colloid Chem.* 51:134 (1947).

(13) Wethern, J. D., *Tappi* 35:267 (1952).

(14) Husemann, E., *J. prakt. Chem.* 155:13 (1949).

(15) Timoell, T., and Jahn, E. C., *Svensk Papperstidn.* 54:831 (1951).

(16) Thompson, J. O., and Wise, L. E., *Tappi* 35:331 (1952).

(17) Yundt, A., *J. Am. Chem. Soc.* 71:757 (1949).

(18) Chanda, S. K., Hirst, E. L., Jones, J. K. N., and Percival, E. G. V., *J. Chem. Soc.* 1950:1289.

(19) Jones, J. K. N., and Wise, L. E., *J. Chem. Soc.* 1952:3389.

(20) Whistler, R. L., and Durso, D. F., *J. Am. Chem. Soc.* 72:677 (1950).

(21) Thompson, J. O. Private communication.

(22) Anderson, E., *et al., J. Biol. Chem.* 121:165 (1937); Anderson, E., *J. Biol. Chem.* 165:233 (1946).

(23) Cottrall, L. G., *Tappi* 33:471 (1950).

(24) March, R. E., *Paper Trade J.*, 127, no. 17:51 (1948).

(25) Jayme, G., and Lochmueller-Kerler, E., *Holz Roh u. Werkstoff* 5:377 (1942).

Recent advances in wood chemistry

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A summary—as non-technical as possible—of recent advances in wood chemistry, especially cellulose chemistry, which will set the pattern for the new or improved products tomorrow.

CHEMISTS ARE such curious fellows that they have no inhibitions in crossing boundaries between sciences. We wood chemists have in the past been accused of doing microscopic research that should be done by silviculturists, wood-penetration studies that should be done by wood-preservation specialists, moisture-movement studies that should be done by physicists, and special strength tests that should be done by engineers. This crossing of scientific boundaries is not a matter of greed on our part, but a characteristic of all chemists. For example, at present the best research on the stress-strain relationships of fibers and fiber mats is being done not by engineers but by chemists, such as Börje Steenberg at the Swedish Forest Products Laboratory and Masao Horio at Kyoto University, Japan. Steenberg has obtained complete stress-strain diagrams on paper in one 1,000th of a second and thereby found differences in papers that do not show up by ordinary tests. These studies are now leading to improved cement bags.

Chemists, such as O. Kratky at the University of Graz, Austria, have delved into higher mathematics to deduce the structure of cellulose from its physical properties.

There are innumerable instances of chemists utilizing principles normally considered to be in the field of physics to determine properties of cellulose and wood. S. G. Mason of the Pulp and Paper Division of the Canadian Forest Products Laboratories is successfully applying principles of flow and electrokinetics to determine internal-surface properties of cellulosic materials. L. V. Forman, formerly with the Institute of Paper Chemistry and now with a paper company, is utilizing optical properties of paper to estimate the extent of bonding. At the U.S. Forest Products Laboratory, chemists have used a number of the physical properties of wood and the flow properties of liquids and gases through wood for deducing the nature of the fine capillary structure of wood.

Other chemists are doing notable work by staying more within generally accepted bounds. Among these are analytical and organic chemists who are solving intricate problems of the composition and constitution of wood. The earliest chemical research on wood was largely a matter of chemical analysis. Laymen might feel that the analytical problem on wood should have been completely solved before now, as we have been analyzing wood for about 100 years. The problem is not that simple. Our older methods of analyzing wood merely determined arbitrary fractions because of the lack of specificity of the reagents. G. J. Ritter of the U.S. Forest Products Laboratory was a pioneer in at least vastly improving this situation. His development of methods for determining holocellulose has made it possible to avoid a large part of the overlapping of isolated components. Recently, however, the late W. G. Campbell of the British Forest Products Laboratory showed that the determination of lignin in wood may be low by as much as 6 per cent in 26 per cent, owing to solution of some lignin in cellulosic solvents and failure to completely dissolve away lignin in cellulose-isolation procedures. Similar indications have been found by others. Research has now been set up at the U.S. Forest Products Laboratory to try to rectify these analytical difficulties.

Lignin research is just beginning to produce data that can be interpreted in terms of lignin structure. Although a detailed discussion of lignin research is beyond the scope of this paper, it may be pointed out that more and more capable investigators are entering the field and attacking the problem from new and varied approaches. Work on the structure of lignin is also continuing at the U.S. Forest Products Laboratory.

Cellulose structure

Recent developments in our knowledge of the fine structure of cellulose have truly been the results of a cosmopolitan effort, for notable contributions have been made by Germans, Austrians, Swedes, Dutch, English, French, and Americans.

Cellulose is made up of chains of anhydroglucose units. When cellulose is dissolved in nondestructive solvents, it disperses in simple chains of these units. During the last 20 years, a number of methods have been developed to determine the length of the cellulose chains, or the degree of polymerization as it is normally called. Such methods include osmotic pressure, viscosity, and ultracentrifuge sedimentation and equilibrium. Recently, light-scattering methods have been used. These different methods have in many instances given quite different results. Only recently have we begun to understand fully the reasons for the differences.

We now know that even native celluloses from different sources have different degrees of polymerization. We know that various chemical treatments and procedures for dissolving the cellulose cause differences to occur in a single cellulose sample. We know that most celluloses are made up of mixtures of different chain lengths and that the different methods give different types of average values. For example, osmotic-pressure measurements give averages of

*Maintained at Madison, Wis., by the Forest Service of the U. S. Department of Agriculture in cooperation with the University of Wisconsin.

the number of units in a chain, viscosity measurements give chain-weight averages, and the ultracentrifuge methods give both a chain-weight average and another more complicated type of average. Only in the hypothetical case of uniform chain length would one expect the different methods to give comparable results.

Fractional precipitation in degree-of-polymerization studies

In the last few years a number of investigators have laboriously fractionated solutions of cellulose by adding chemicals to decrease the solubility of the cellulose. This causes the longer, less-soluble chains to precipitate. If small amounts of precipitating agent are intermittently added and the precipitate is filtered off each time, the cellulose can be separated into a number of fractions. Separations are not exact, since further fractionation of the first fraction shows that, after each fractionation, the degree-of-polymerization range in a cellulose is further narrowed down. We now know that degrees of polymerization can vary from about 20 to 10,000. Hemicelluloses and degraded cellulose fall in the lower range and stable native celluloses in the upper range. Wood pulps have average values in the range of 600 to 2,000, with varying amounts of material with short chain lengths. Some wood pulps contain cellulose with a degree of polymerization as high as 4,000.

Fiber strength and chain length

These degree-of-polymerization studies have practical as well as theoretical value. The strength of cellulose fibers, both in the natural and rayon forms, and of various cellulose films is highly dependent on the chain length in the range of short chain lengths. Above a degree of polymerization of about 200, however, the chain length is no longer significant in determining strength. In making rayon, cellophane, and cellulose acetate, it is desirable to have the degree of polymerization no higher than needed to obtain optimum strength, because this simplifies the manufacturing process by making possible higher concentrations of solutions and easier flow of the cellulose and removal of air. All cellulose-derivative manufacturers, hence, closely control the degree of polymerization of their raw material.

Degree-of-polymerization studies show that, upon hydrolysis, cellulose does not break down directly to glucose. Instead, limiting values are obtained for the undissolved residue that tend to persist until the cellulose is almost completely decomposed.

Crystalline and amorphous regions

X-ray studies on cellulose fibers have shown that two different orders of regularity in structure exist. Four anhydroglucose units make up the smallest repeating unit. This information for a while made the degree-of-polymerization data appear questionable. It was soon learned, however, that this small unit represented the frequency of twist in the cellulose chains. A little later larger crystallite units were detected by means of x-ray studies. The crystallites have diameters of about 50 to 100 and lengths of about 500 to 600 Angstrom units. This length corresponds to a degree of polymerization of only 100. The question was hence raised as to how single chains in solution could be longer than bundles of oriented chains in the solid crystallites. After a considerable period of controversy, it is now fairly well accepted that single cellulose chains pass through several zones of preferred orientation with neighboring chains, and that, in between, they pass through disoriented zones and in a random manner enter any of the adjacent oriented zones. The oriented zones are referred to as the crystalline regions, and the disoriented zones as the amorphous regions.

Recent electron-microsope pictures of hydrolyzed cellulose, made by replica and shadowgraphing techniques, disclose particles of a size and shape postulated from x-ray data. The particles are still not sufficiently defined by the pictures to permit any far-reaching conclusions to be drawn other than that they probably are crystallites.

X-ray studies have shown that water and most other chemicals can penetrate the amorphous regions but not the crystallites. Adsorption of water hence occurs only within the amorphous regions and on the surface of the crystallites. Water adsorption should thus be an index of non-crystallinity, or the accessibility of cellulose.

Accessibility of celluloses

During the last few years, a number of investigators have tried to develop special means of determining the accessibility of different celluloses. Such information should indicate the ease with which the celluloses will respond to various processing reactions. An x-ray technique was recently developed for determining the degree of crystallinity of cellulose. The degree of crystallinity has also been estimated from the density of the cellulose, on the assumption that the crystallites are denser than the amorphous regions. Attempts have been made to determine accessibility from the rate of hydrolysis. It is assumed that the initial rapid hydrolysis occurs in the amorphous regions, followed by a slower attack on the crystallites. This method, however, gives higher values for the degree of crystallinity than the physical methods. It was recently shown that this is probably caused by crystallization of amorphous material at both ends of a crystallite. Breaking of chains in the amorphous region by hydrolysis makes such rearrangement and crystallization more readily possible. A new chemical means of determining the accessibility of cellulose developed at the U.S. Forest Products Laboratory is based on the reaction of cellulose with formic acid, which does not break the chains as does hydrolysis. This method gives accessibility data in agreement with the x-ray and density values and furnishes a means of determining absolute as well as relative accessibilities from moisture adsorption.

Although our understanding of the fine structure of cellulose has been vastly clarified by recent studies on degree of polymerization and accessibility, new problems have appeared on the horizon.

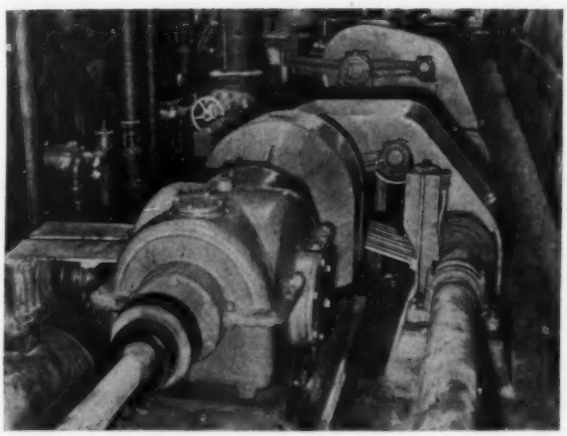
Kratky in Austria has shown that the simple explanation of crystallites being cylindrical bundles of oriented cellulose chains does not meet all of the mathematical requirements of the system. He has recently postulated that the crystallites are bundles of oriented ribbons of cellulose chains, each ribbon containing several chains, and that the amorphous regions do not consist of single cellulose chains but of ribbons of cellulose chains just one chain thick. Data on the moisture adsorption of hydrolyzed cellulose obtained at the Forest Products Laboratory do not fit in with the present accepted picture of crystallites. It appears that some modification, such as that of Kratky, may be necessary to explain these data adequately.

This brief explanation of what has been learned about the fine structure of cellulose illustrates some of the difficulties involved in working out the architecture of something that cannot be seen, except in part through electron-microscope pictures that are difficult to interpret. It explains how structures are indirectly deduced, and how, as further information is obtained, these structures have to be modified.

Erratum

Animal glues . . . , December, 1952 issue, page 116, last column, fourth paragraph—

The batches are aged at 65°F and not at 650°F as stated.



Variable speed paper machine drive using Texrope D section belts and through shaft Vari-Pitch motion control sheaves equipped with pilot motor push button control to drive each section

Details of a motion control Vari-Pitch drive at Combined Locks Paper Co., Combined Locks, Wis., showing tightener and adjusting mechanism on a winder; winder drives are easily changed

Analysis of variable speed requirements

E. A. GAHL
Texrope Drive Section
Allis-Chalmers Mfg. Co.

IN THESE DAYS OF HIGHLY competitive operations, use of variable speed drives may often mean the difference between doing business at a profit or a loss. Variable speed drives can help boost production, ease the manufacturing process, and provide correct speeds for the operator and the product.

There has been a great increase in the use of mechanical variable speed devices throughout industry in recent years. This trend is certain to continue as the advantages inherent in the ability to change speeds at will are more widely promulgated.

With this trend, however, have been developed drives not designed for the specific operations they were intended to perform. In most of these instances, a lack of analysis by the purchaser or field engineer unfamiliar with drive types available has proven costly.

Advance analysis

By analyzing adjustable speed problems in advance, it is often possible to select a reasonably priced drive which will effectively do the job. As an example, consider the requirements of one paper mill employing a centrifugal pump driven by a 75 hp, 1200 rpm motor to deliver 2,000 gallons per minute. At some later date, additional pipe was to be added, which would call for increased pump speed to overcome the added pipe friction. It was decided that a variable speed drive which could be adjusted to take care of the added load and still maintain the original capacity would be the best choice.

Calculating a mean speed of 860 rpm, the first inclination was to select a six D120-belt, 13- to 16-inch variable speed sheave with 20-inch companion sheave drive (designated as 6-D120-130/160-200), which would give a speed range of from 700 to 930 rpm. Although the speed range of this drive is more than is required, there can be no criticism on the selection of such a unit, unless it be the cost, which would be $831.26 net.

Careful study

Reviewing the requirements of this installation, it was found, however, that several factors could be changed without hinderance to the drive. First of all, the load factor on the original selection was more than adequate and certainly not necessary. Then, the centers were longer than required. And finally, a large "D" section belt ought always to be used with larger than the 13-inch diameter (minimum) sheave when possible.

With these considerations in mind, an alternate selection was made consisting of a nine C96-belt, 10.5- to 12.7-inch variable speed sheave with 16-inch companion sheave drive (designated as 9-C96-105/127-160), with an adequate 28 per cent load factor, practical 26.5-inch centers, and good, favorable sheave diameters. This drive was supplied at a cost of $513.77 to save the mill $317.49 per drive.

At one time, it was believed thrifty to specify small diameter sheaves since their initial cost is less. Today we know that larger and more favorable diameter sheaves with less grooves are more economical since they give longer belt life and eliminate belt slip. A quick cost comparison is possible by referring to the following table, with drives in each instance powered by 75 hp, 1200 rpm motors:

Drive	*Actual Horsepower*	*Price*
6-D120-130/160-200	115	$831.26
5-D120-130/160-200	96	725.11
10-C96-105/127-160	107	562.36
9-C96-105/127-160	96	513.77

Variable speed drives are being used consistently on winder rolls and rewinders. They can be supplied for any size rolls, whether of the same diameters or whether one roll is larger than the other. Proper belt tension is maintained through the use of an adjustable tightener or idler. Thus, the rolls can be driven from any source of power, whether it is a line shaft or electric motor.

Back-line shafts

More and more variable speed drives are being installed on back-line shafts. They help to eliminate the inevitable repairs on the bevel gear system. Synchronization of sections is simple where variable speed drives are employed. Operations are controlled by adjusting the handwheel or pushing the fast or slow button on the push button station.

For those contemplating modernizing their paper machines, a new style shaft-type variable speed sheave in a self-contained unit is now available. This motion-control type sheave is mounted directly on its own shaft for ease in placing it wherever it is needed.

New $500,000 plant of Bay West is served by efficient rail and truck facilities

Modern materials handling keys Bay West expansion

D. W. ZEIGLER

A PAPER MILL'S finished product is but raw material at Bay West Paper Co., Green Bay, Wis. Converting that raw material into millions of industrial type paper towels daily necessitates the smoothest possible flow through the plant. A clockwork atmosphere must surround the materials handling operations. The firm constructed its new $500,000 factory with an eye toward achieving that atmosphere.

Until July 1952, Bay West was operating in cramped quarters at its original building in the heart of Green Bay's industrial district. Warehousing was at some distance from the plant, and the actual manufacturing processes were housed on three floors. Movement of materials—from jumbo rolls to packaged toweling—suffered from lack of space. The streamlining required of modern and efficient manufacturing methods could not be achieved economically under these conditions.

It was with these things in mind that Bay West officials set about planning the new single-story structure, which is located on the outskirts of the Wisconsin city and served by the trackage of the Milwaukee Road. Containing more than 47,500 square feet of floor space, the steel and brick building was constructed with an eye to expansion. The six-acre site provides sufficient space for tripling the manufacturing facilities; while the entire west wall is of insulated metal panelling that can be removed to permit extension of the floor and roof as needed.

Well over two-thirds of the floor area is devoted to the converting (or manufacturing) facilities, the raw materials warehouse, and the finished goods section. The remainder of the fire-resistant building is utilized as loading docks, print shop, offices, laboratory, first aid rooms, and employee lounges.

Raw materials handling

The factory building was so constructed that front office entrances are on ground level, while at the rear the loading docks are at truck and boxcar door height. The floor level is the same throughout the plant. Jumbo rolls of sulfate toweling stock in 40- and 60-inch sizes are received from Mosinee Paper Mills Co.—of which Bay West is a division—by both truck and rail. The rolls are stacked on end from floor to ceiling in the 60- by 124-foot warehouse section. The 21-foot ceiling, plus the on-end storage, has resulted in a savings of from 25 to 30 per cent on warehouse space. And, according to J. A. Long, general superintendent, damage to the rolls has been cut about 55 per cent from that experienced with the older cradeling, which caused considerable ovalling and puncturing. In addition, injury to workers has been considerably minimized from the time when holding blocks in the storage area had to be removed and the rolls skidded to the machines.

One Clark Equipment Co. roll clamp lift truck handles all paper stock as it enters the plant. A single operator can thus pick up the rolls as they are delivered by either boxcar or truck, stack them in the storage area, and feed them to the converting machines as needed. Ceiling hoists manufactured by Harnischfeger Corp. of Milwaukee and operated by electric motors handle the huge rolls in transfer from lift truck to machine. The hoists are so constructed on "U" shaped trolleys on the ceiling that one hoist can serve two machines. The lift capacity of each unit is 2,000 pounds.

Converting machines

For smoother and quicker handling operations, the converting area of the plant is located adjacent to the warehousing space for the jumbo rolls. Folding and rewinding machines have been installed the length of the 80 by 124-foot section. It is here that the raw stock is converted to various types of hand and bath towels for commercial, industrial, and institutional use. In a matter of minutes the paper is folded, cut, labeled, and boxed for shipment throughout the country.

Five standard interfolding machines are operated. Manufactured by Paper Converting Machine Co., Green Bay, these machines automatically fold, interfold, and cut the web toweling in one

Pattern load of 18 cases is moved from storage area by means of a lift truck equipped with carton handling clamp arm

Roll clamp lift truck handles jumbo rolls; Leo Tank is at the controls as roll is moved from warehouse to machines

operation. The operator removes from the delivery table a "bundle" of 250 folded and interfolded sheets in the 40-inch width at the rate of 10 bundles per minute. The bundles are jogged so that the sheets are in alignment and then placed on the labeler's table, where four 10-inch labels are applied. A band saw is then used to cut the 40-inch bundles into the 10-inch towel packages ready for packing; an average of 30 cases are produced per hour per machine.

"Mosinee" towels produced on the interfolding equipment include those marketed under the trade names Prep-Towl and Zip-Towl, both pure sulfate products in the 10¾ by 10-inch size. The Prep-Towl has a basis weight (500 sheets 24 by 36 inches) of 32 pounds, a mullen of 28 psi, and an absorbency rate (time required to absorb 0.50 c.c. water placed on top) of 150 seconds. The Zip-Towls have a basis weight of 28 pounds, a mullen of 22 psi, and an absorbency rate of 295 seconds. Both are natural brown. Also manufactured on the interfolders are windshield wipes, some of which are made for oil firms such as Standard Oil, with the remainder marketed under the Mosinee trade name Film-Fyter.

A multifolder, also manufactured by Paper Converting, cuts and folds the three-fold Trim-Towls, a new addition to the Mosinee line. An average of 86,000 towels, or 23 cases, are turned out hourly. Trim-Towls, also pure sulfate and natural brown, measure 10 by 9½ inches, have a basis weight of 28 pounds, a mullen of 22 psi, and an absorbency rate of 295 seconds.

Two rewinders have been installed to handle Bay West's production of roll towels. One of the machines was manufactured by Hudson-Sharp Machine Co. of Green Bay, while the other is a Paper Converting product. The equipment automatically slits 60-inch stock into 10-inch widths. An average production rate is 180,000 towels per hour. Turn-Towls are turned out in 417-towel rolls, while Roltowls have 300 towels per roll. The rewinder producing Turn-Towls has an output of about 27 cases per hour, while Roltowls enter the production line at about 20 cases per hour. The former are 9⅜ by 10¾ inches, have a basis weight of 32 pounds, a mullen of 28 psi, and an absorbency rate of 150 seconds, while the Roltowls are in the 10 by 10-inch size, have a basis weight of 28 pounds, a mullen of 22 psi, and an absorbency rate of 225 seconds. Both are pure sulfate and natural brown.

W. J. Servotte
Vice President

B. K. Gage
Sales and Adv. Mgr.

L. E. Plettner
Asst. Sec.-Treas.

J. A. Long
General Supt.

Conveyors

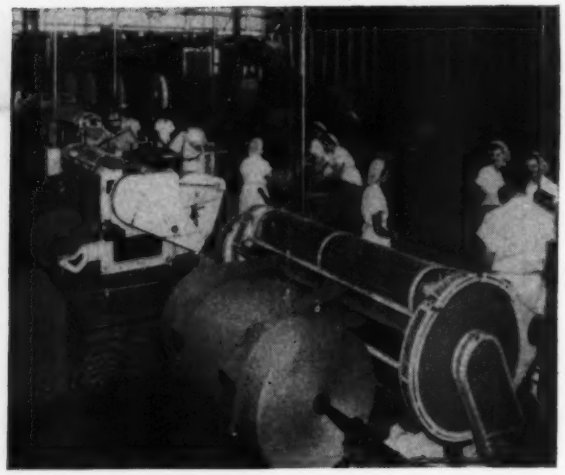
As each of the Bay West products comes from the folding and rewinding machines they are packed in corrugated cartons by the labeler and placed on the triple-deck conveyor system for transfer to the sealers and compressors. The cartons are produced for Bay West by Green Bay Box Co. and arrive at the plant in steel-strapped bales each containing 260 cartons. The bales are moved to the machines by a Clark fork-lift truck.

The 250-foot conveyor, a product of Standard Conveyor Co. of North St. Paul, Minn., delivers the cartons to the case sealers at the rate of 10 a minute, then into the compression units, which are controlled by a mercury switch. The sealers and compressors are products of the Standard-Knapp Division of Hartford-Emhart Mfg. Co., Portland, Conn.

On moving into its new plant, Bay West added eight-foot sections to each of the compressors, thereby allowing more time for the glue to set as the cartons move through the 24-foot units. According to Mr. Long, the saving thus realized on glue consumption amounts to approximately 2½ cents per pound. Glues used in the operation are produced by Williamson Adhesives Inc., Chicago.

Storing and shipping

Cartons leaving the production line are moved to a storage area adjacent to the plant's production section. Here space is provided for the stocking of 2½ weeks' output. Opening off the storage area is the inside loading dock, which can accommodate four boxcars. Also included in the plant's shipping facilities is space for three semi-trailer trucks on the rail (or east) side of the building. The west side of the plant provides



Rewinders used for roll towel production; paper is fed from jumbo rolls to be slit into 10-inch widths

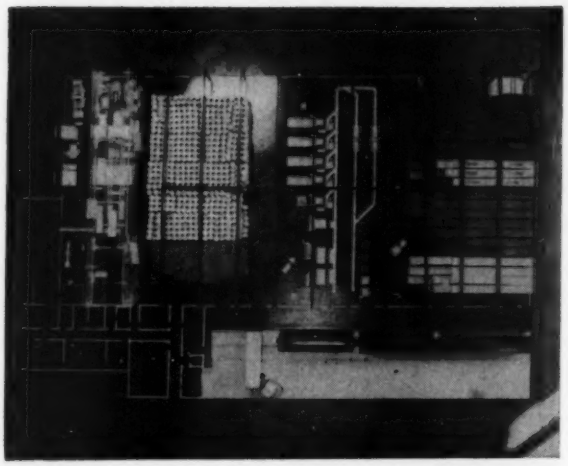
Cartons are delivered to the sealers and compression units at a rate of 10 a minute; Leo Baeb watches the operation

Line of interfolders in production area; towel "bundles" are jogged on tables, labeled, and cut on band saws (far left)

Load of outgoing cartons is moved into box car at inside loading dock; maneuvering the truck is Bob Scheller

Print shop located just off the main production area; Bay West prints all its labels, letterheads, promotional material, and is practically self-sufficient in this respect

Various Bay West products are displayed in the firm's conference room; six cabinet types are demonstrated by B. K. Gage, sales and advertising manager.



Air view of scale model used in determining plant design; offices are at right, with production area centered between warehouse space and storage; white lines at center are conveyors

25-year employees are (l to r) Bernard Kaster, print shop foreman; Albert Smits, assistant plant superintendent, and Ralph Rice, head of the machine shop; on the wall are safety trophies

space for three truck docks for outbound finished cases and three truck docks for inbound roll stock.

As the cartons are removed from production they are stacked in pattern loads of 36 cases for movement to the finished goods storage. Transfer here is by means of an electric Clark lift truck equipped with a carton-handling clamp arm, thus avoiding the use of pallets. Known among the employees as a "squeeze truck," the device is similar to the standard heavy-duty clamp manufactured by Clark, but is more ruggedly constructed, with heavier slide arms and guides to permit increased arm travel. Clamping pressures of up to 6,000 pounds at the heel of the arms are available. The truck is also used for boxcar loading.

Laboratory, print shop and maintenance

Not as yet completely equipped is the testing laboratory, which is located close by the production area. Included in the equipment is a mullen tester manufactured by B. F. Perkins & Son Inc. of Holyoke, Mass.

A print shop incorporated in the flow plan of the Bay West plant provides a cylinder press made by Miehle Printing Press Mfg. Co. of Chicago, a Chandler & Price Co. platen, and two ATF Kellys. Bay West prints all its own labels, letterheads, promotional material, etc., and is self-sufficient in this respect with the exception of shipping cartons, which are printed by the manufacturer, Green Bay Box.

Important in the plant's facilities is the machine shop where all maintenance work is done. The 40 by 40-foot shop contains a lathe, drill press, and other equipment used by the staff to keep the converting machines in good running order.

Steam is provided for the plant by a Cleaver-Brooks Co. boiler with a capacity of 2,760 pounds per hour. Heating throughout the building is regulated by individual compressed air thermostats installed in each office and work room. These instruments are products of Johnson Service Co., Milwaukee.

Marketing

Bay West markets its various products through jobbers who employ more than 3,000 jobber salesmen. Head of sales is B. K. Gage, sales and advertising manager. Cabinets accommodating the roll and folded towels are made for the firm by Alwin Mfg. Co. of Green Bay. Controlled dispensers are leased by Bay West, while the regular dispensers are sold outright.

A small portion of the Bay West production is white toweling. Stock for this output is purchased from Nekoosa-Edwards Paper Co., Port Edwards, Wis. This stock, like that received from Mosinee, is sulfate and ranges from 25 to 32 pounds basis weight.

Safety record

Bay West is proud of its safety record of no accidents from June 1937 to August 1950. During this 13-year span the firm was cited annually by the National Safety Council. Largely responsible for the safety consciousness of the employees is Mr. Long, who has for many years taken active interest in the safety movement. Mr. Long has developed programs at the plant to increase the awareness of the necessity of safety among the workers. Currently, the plant is accumulating another unbroken record, with the last lost-time accident having been on May 12, 1952. An up-to-date first aid room in the new plant is being fully equipped to handle minor injuries.

Among other facilities demonstrating Bay West's awareness of the advantages resulting from harmonious employer-employee relations are the lounge quarters and locker rooms located on the 20 by 124-foot mezzanine built over the printing plant and maintenance shop. Here, production workers can relax and eat lunch in a home-like atmosphere. A built-in kitchen unit, including stove, refrigerator and sink, has been installed in the women's section, while shower facilities are provided for all employees.

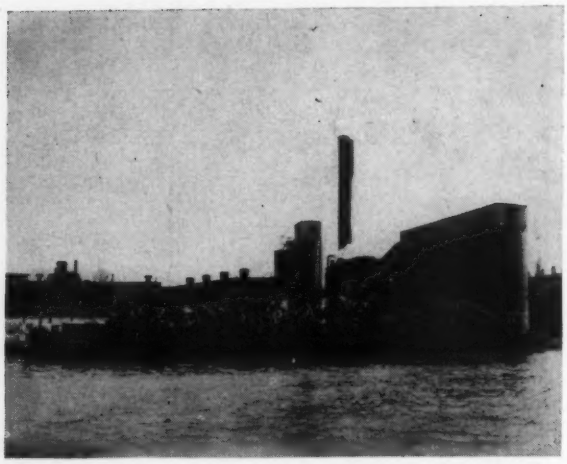
Bay West's history and personnel

On a recent production day Bay West Paper Co. turned out 10 times as many cases of hand and bath towels as on an average day in August 1932. This remarkable growth has been achieved only by a constant effort to keep abreast of the latest production and handling methods. Knowledge of these modern methods was put to full use in the planning of the firm's new plant.

The 30-year history of the Green Bay converter began in 1922 with the incorporation of Green Bay Paper Napkin Co. to produce napkins on a machine invented by one of the founders. In 1924 the production was expanded to include toweling, and shortly thereafter the name was changed to Bay West Paper Co.

Mosinee Paper Mills Co. of Mosinee, Wis., purchased controlling interest in the firm in 1928. Although Bay West is a wholly owned subsidiary, operation is as a separate corporation, with A. P. Woodson serving as president of both companies, although he takes no active part in the operation of the Green Bay plant.

Vice president and general manager of Bay West is W. J. Servotte, who joined the firm in 1929. George Ruder of Wausau is secretary-treasurer. Assisting Mr. Servotte is B. K. Gage, sales and advertising manager. J. A. Long is general plant superintendent, while L. E. Plettner is assistant secretary-treasurer and purchasing agent.



SIDE VIEW of one of two new barges built for Chesapeake by Dravo Corp.

WOODEN GUNWALES of old barges took a beating in unloading operations

Barges help solve Chesapeake's marine materials handling problems

COVERING MORE than 140,000 acres in Virginia, Maryland and Delaware are the pine forest lands of Chesapeake Corp. of Virginia. From these timber holdings come most of the pulpwood used by the company to produced an average of 500 tons of unbleached sulfate pulp daily. Of this output, 150 tons is sold as market pulp, and the balance is made into paperboard and other kraft papers.

When Chesapeake's pulp mill was built in 1913, the company founders selected a site at West Point, Va., conveniently close to the woodlands around Chesapeake Bay. By 1918, the firm had acquired 2,654 acres of timberland in surrounding counties, and the mill's daily production capacity was 50 tons of pulp and cylinder board.

Rapid growth

As the corporation expanded during following years the problems of obtaining and transporting pulpwood to the mill became increasingly difficult. This is exemplified by the fact that in the past 34 years land holdings of the company have grown more than 50 times, while production increased tenfold. Recently, stockholders endorsed a proposal to increase real estate holdings up to 500,000 acres to assure reserve pulpwood supply.

To solve many of the problems of transporting and handling pulpwood, the company recently overhauled its entire system. One of the important phases of this program was the addition of two specially designed pulpwood barges to the company's fleet. It is contemplated that the new vessels, designed and built for Chesapeake by Dravo Corp., Pittsburgh, should bring about substantial savings in manpower and maintenance costs to the company.

The company's mill is ideally located for the marine transportation of pulpwood. It is situated at the point where the Pamunkey and Mattaponi rivers join to form the York River, which flows into Chesapeake Bay. Marine arteries lead from the mill to 20 company-owned landings where pulpwood is loaded into barges.

Until the new barges were placed in operation early in 1952, the company's barge fleet was made up of converted ships with modeled hull forms. The decks were removed from each ship to expose the entire hull.

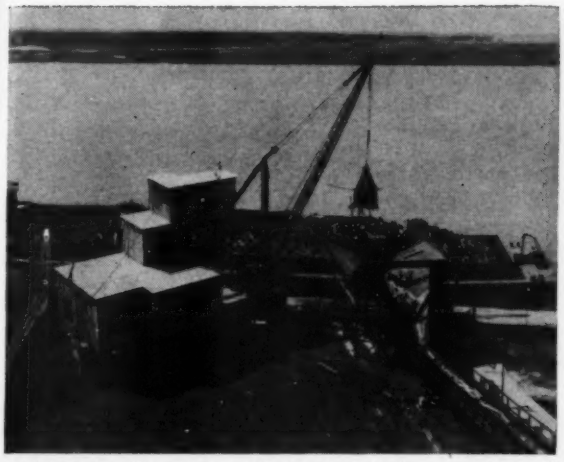
In connection with the company's improved wood handling system, barge unloading derricks were equipped with "orange peel" grapples. These are more efficient for handling logs than the conventional bucket-type unloader. But difficulty was experienced in using the new grapples to unload the old barges. The grapples could not be used efficiently because they continuously were impeded by transverse bracing beams in the barges. Moreover, it took considerable time to clean the holds of these barges because of their transverse bulkheads and exposed rib framing members. Cleaning bark and logs from the holds had to be done by hand, a time-consuming job.

Damage reduction

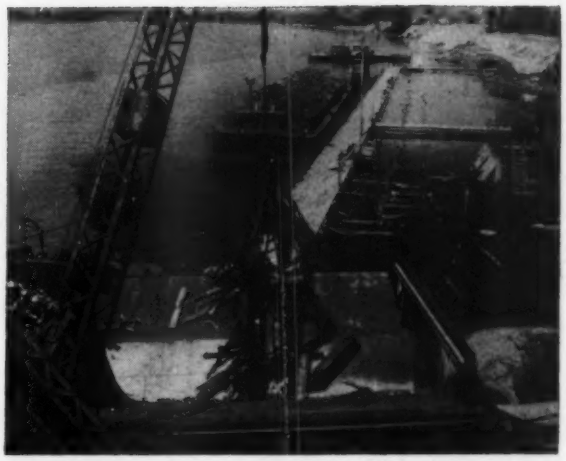
Another problem with the older vessels was the constant round of maintenance required to keep them in operating condition. Unloading buckets, regardless of how skilfully they are manipulated by derrick operators, frequently damage the wooden gunwales and steel structural members of the older vessels. The result was that the company's marine maintenance and repair shop is kept busy repairing damaged barges, in addition to routine maintenance chores required for efficient fleet operation.

None of these problems has been encountered with the new Dravo barges, which are of welded steel construction throughout. The vessels, designed to carry 400 units each containing 180 cubic feet of pulpwood, are 190 feet long overall. The cargo hopper is 166 feet long, 30 feet wide and 12 feet deep. A steel coaming 4½ feet high is built around the cargo compartment.

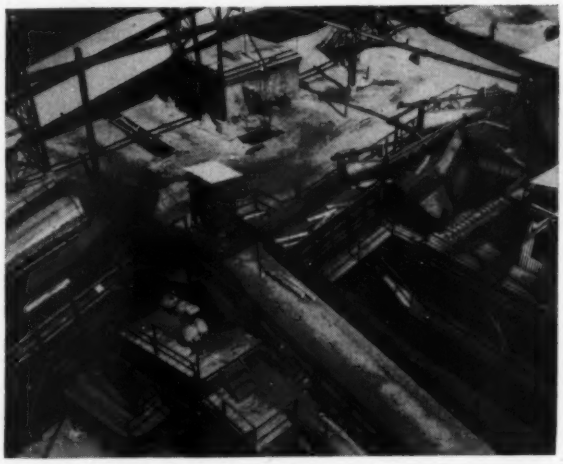
Structural design of the Dravo barge eliminates the necessity for transverse bracing beams of bulkheads across the cargo hold. This provides operating freedom for the "orange peel" grapple, and pulpwood can be unloaded faster because the derrick operator does not



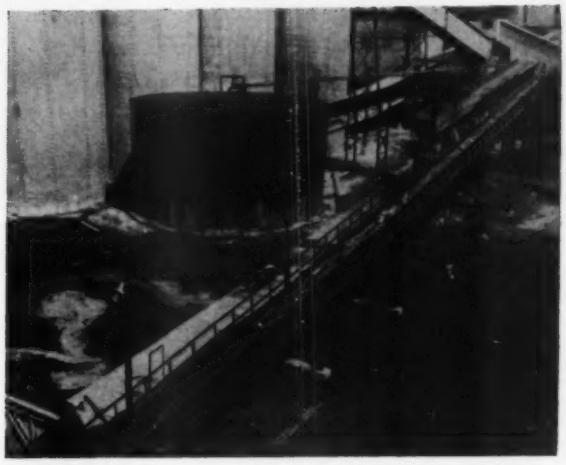
STIFF-LEG derrick used to unload pulpwood; logs travel to mill on rubber belt conveyor



GRAPPLE dumps pulpwood into hopper which feeds conveyor



KEY CONVEYOR point as seen by control man from tower in woodyard



LOGS RIDING conveyor belt from unloading area to the barking drums

have to maneuver the equipment to avoid striking structural beams in the cargo hold. The steel coaming has been constructed to absorb impact of the unloading buckets.

The innerbottom and sides of the cargo hold are lined with steel plate to provide smooth surfaces and prevent snagging of unloading grapples. A small bulldozer operated by one man can clean the hold of bark. On the older vessels a crew generally is required to shovel bark by hand.

Freedom of navigation

Another feature of the new flat-bottomed barges is their shallow draft which permits them to be navigated on waterways which could not be navigated by the largest ship hull barges. Draft of the new barges is only 8 feet, loaded with 400 units of pulpwood.

A deckhouse, constructed of steel, has been installed on each of the new barges as quarters for the barge captain. Each barge is fitted with anchor equipment and other accessories. They are classified A1 by the American Bureau of Shipping for service on rivers and intracoastal waterways inside a line between Cape Charles and Cape Henry.

In its marine operations, Chesapeake Corp. uses three diesel tugs. They are the *John F. Lewis,* 850 horsepower; *Chesapeake,* 450 horsepower, and the *C. O. Nichols,* 240 horsepower. In addition to the two new barges, Chesapeake also has nine other pulpwood barges and three derrick boats.

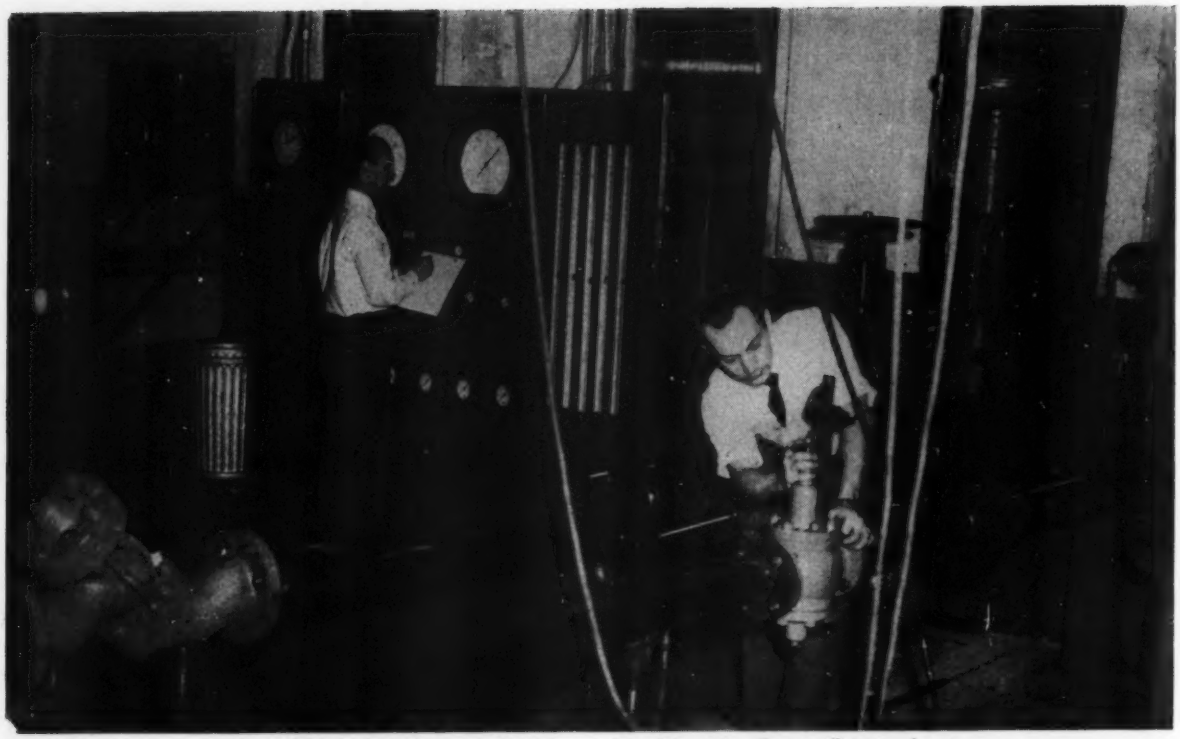
Barges are towed one at a time on about 800 feet of steel cable. The new barges are equipped with fixed skegs to prevent excessive yawing or side-slipping when towed behind a tug in deep water. The older barges have rudders which must be controlled by the barge captains.

About the longest journey made by vessels of Chesapeake's fleet is a 260-mile round trip to a landing on the Potomac River in Maryland.

To load the barges at the company's various landings, the derrick boats are used. Pulpwood is trucked to the landings from adjacent timberlands and stockpiled there until needed at the mill.

Unloading facilities at the company's wharf, which fronts on the Pamunkey River, consist of two stiff-leg derricks which handle "orange peel" grapples. Pulpwood is dropped into hoppers which feed onto conveyors leading directly to the two barking drums. The conveyors also can be switched to serve the mill's wood storage yard, which has a capacity of 14,000 cords.

The entire materials handling system recently was renovated to achieve better efficiency. All operations in the woodyard are under the direction of a control man in a high centrally located control tower from which he can observe the entire system. At his fingertips are push-buttons which control all the conveyors. The towerman is in constant telephone communication with the crane operators and other woodyard personnel. This system has resulted in faster and safer materials handling operations.



Test equipment in valve research center used in determining flow coefficient valves

Valve sizing accuracy . . . .

. . . Without the use of simplified theory and reasonable assumptions, the practical problem of valve sizing becomes hopelessly complicated

R. A. ROCKWELL*

THE DETERMINATION of a control valve size for a given application is not an exact science. While it is always premised on a full knowledge of actual flow conditions, freqently one or more of the conditions are by necessity approximations. It is the evaluation of this flow data, therefore, that really determines the final valve size. Common sense and experience are the prime requisites.

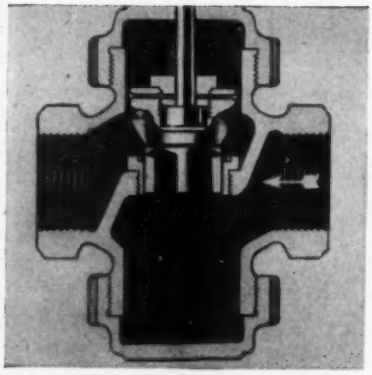
The use of the valve flow coefficient (C_v) materially simplifies the problem of control valve sizing. This C_v provides a simple method applicable to a wide variety of valve constructions, valve sizes, and field services; because of its importance, an understanding of its development, scope, and limitation is essential.

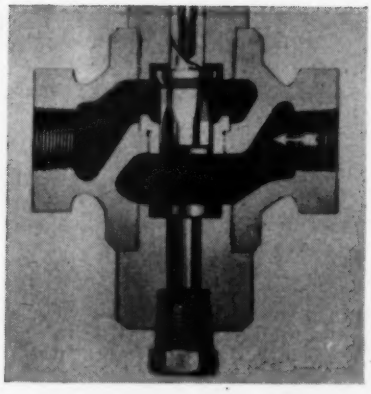
The valve flow coefficient is the number of U.S. gallons per minute of water which will pass through a given flow restriction with a pressure drop of 1 psi. It is a capacity index. Any flow problem either for gas, steam, or liquid can be converted to the equivalent valve flow coefficient. In other words, the flow of any fluid through a restriction with a known pressure drop may be expressed in terms of gpm of water at 1.0 psi pressure drop. This flow restriction can be an orifice plate, a length of pipe, a hand valve, or, more specifically for control purposes, an automatic control valve. The C_v does not involve any specific flow restriction but is based on the fundamental law of fluid flow ($v = \sqrt{2gh}$). All sizing formulas, slide rules, alignment charts, and tables are based on this simple law.

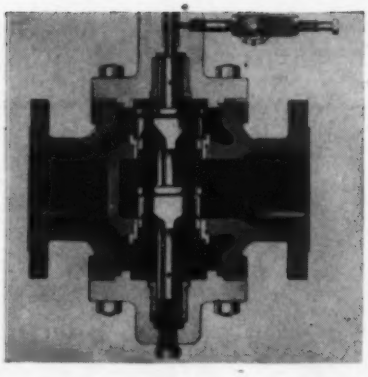
For liquids, C_v is equal to the flow in gpm divided by the square root of the pressure drop in psi and is corrected for specific gravity by multiplying this expression by the square root of the actual flowing gravity. For steam and gases, the use of C_v is almost equally simple. In the gas and steam equations, suitable constants permit the use of C_v and convenient units for flow, pressure, temperature, and specific volume.

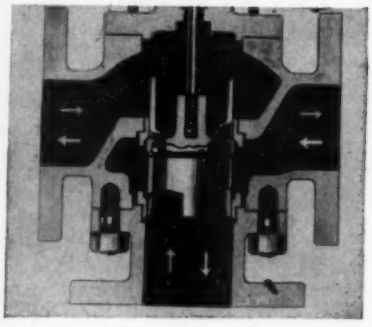
A control valve which has a C_v of 10 means that its effective port area (in the fully open position) is such that it passes that 10 gpm of water with a 1 psi pressure drop. This is the approximate C_v capacity of a 1-inch control valve. The numerical value of C_v simply expresses the number of gallons per minute of

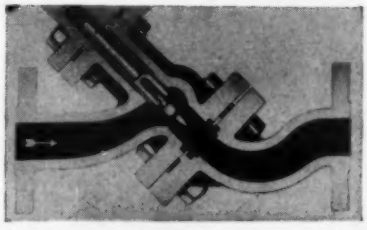
*Technical consultant, Valve Division, Minneapolis-Honeywell Regulator Co.











Five of the many possible combinations of valve bodies and plugs; variations in ratio of port area to body area and valve efficiencies make calculation of C_v generally impractical

water flow which would result from a 1-psi pressure drop.

The maximum flow capacity of a valve is a complex function of the port area, plug design and body design. Valve efficiencies are dependent on the valve design, the flow pattern, and the ratio of the port area to the body area. In view of the wide variety of designs and the extreme difficulty in determining the valve efficiency, it is generally impractical to calculate the valve flow coefficient, and all capacity data should be determined experimentally.

The C_v rating of a valve is always specified at the rated lift or in the wide open position. Valve flow characteristics are frequently plotted in terms of lift versus C_v. The valve rating is then the C_v at 100 per cent lift, and the use of C_v for all other lifts is a convenient way of expressing flow at a constant drop.

Must make reasonable assumptions

It should be recognized that present valve sizing procedures are based on assumptions that are not strictly valid and on theory which in many instances is inadequate. However, without the use of simplified theory and reasonable assumptions the practical problem of sizing becomes hopelessly complicated. Although C_v is based on experimental data and makes corrections for body losses and efficiency of the port and passages, the experimental determination of its value does not take into account the variations in the characteristics of the fluids in question; nor does it allow for changes in the state of the fluid or the wide variations of pressure drop and velocity which may exist in various installations. It is in this region that the rule of the thumb, based on experience and rational assumptions, is necessary.

Improved techniques and more exact determinations of the behavior of fluids under various pressure drop conditions may improve the theoretical accuracy, but the over-all accuracy will still be limited somewhat by the difficulty of evaluating operating conditions.

With the exact maximum flow known, it is customary and desirable to provide a safety factor and to determine the valve size on an arbitrary flow usually well in excess of the known maximum. This excess is dependent on the operating conditions of the application, the valve size, and the construction of the valve under consideration.

Exact pressure drop seldom known

Sizing procedures are predicated on reasonably exact knowledge of the pressure drop across the valve. In many instances the actual pressure drop used is at best only an approximation, and, therefore, care must be exercised to select the average pressure drop consistent with operating conditions at the maximum flow.

While sizing formulas are based on the assumption that the flow varies as the square root of the pressure drops, there is some question as to the validity of the application of the square root law to such a complex restriction as a control valve, especially under extreme operating conditions. Except in unusual circumstances, the error resulting from the use of the square root law is seldom of sufficient magnitude to justify complicating the sizing procedure by corrections which, in many instances, may be extremely difficult to correlate to the case at hand.

The formulas for steam and gases include a compressibility correction which is a function of the outlet pressure psia (P_2). This is an assumption which is not strictly true, as the exact correction should be some intermediate value between the inlet and outlet pressures. The use of the outlet pressure is a conservative simplification tending to underrate the valve capacity up to approximately 15 per cent at the critical pressure ratio.

Correct interpretation of data is imperative

After the C_v has been determined, there still remains the task of selecting the optimum valve size from both a performance and economic point of view.

For example, if a C_v of 32 is obtained, and requirements call for a double-seated diaphragm motor valve, the choice must be made between the 1½-inch size with a C_v of 30 and the 2-inch size with a C_v of 50. At this point, good judgment dictates a review of the operating data as a guide to the final size selection. In the foregoing example, if the value of the flow used in figuring the formula included a substantial safety factor, or if the pressure drop was lower than could be reasonably expected, the use of the 1½-inch valve would probably meet all the performance requirements at a minimum cost. On the other hand, if very accurate flow and pressure drop figures were available and used without the addition of a safety factor, it would be wise to select the 2-inch size.

This guess-estimating of the final valve size emphasizes the futility of worrying about small theoretical corrections which actually serve no useful purpose in the final selection of the valve.

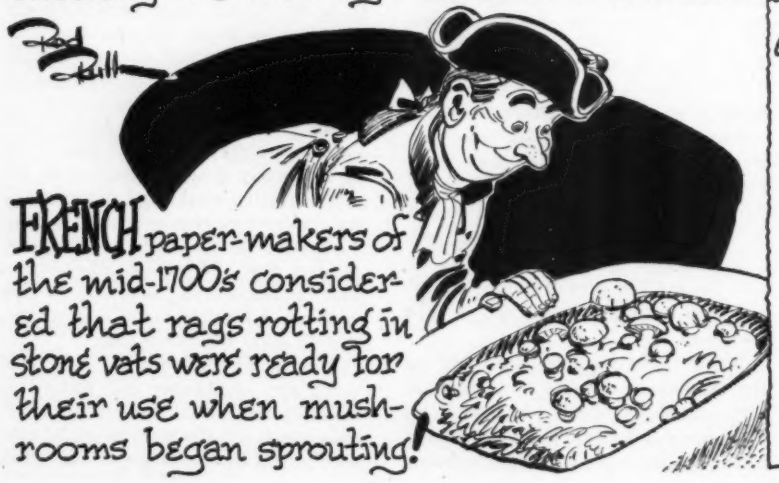
PAPER SKETCHES

The NUMBER OF TREES DESTROYED in the United States in an average year by forest fires would supply every daily newspaper in the country with enough newsprint for an entire year!

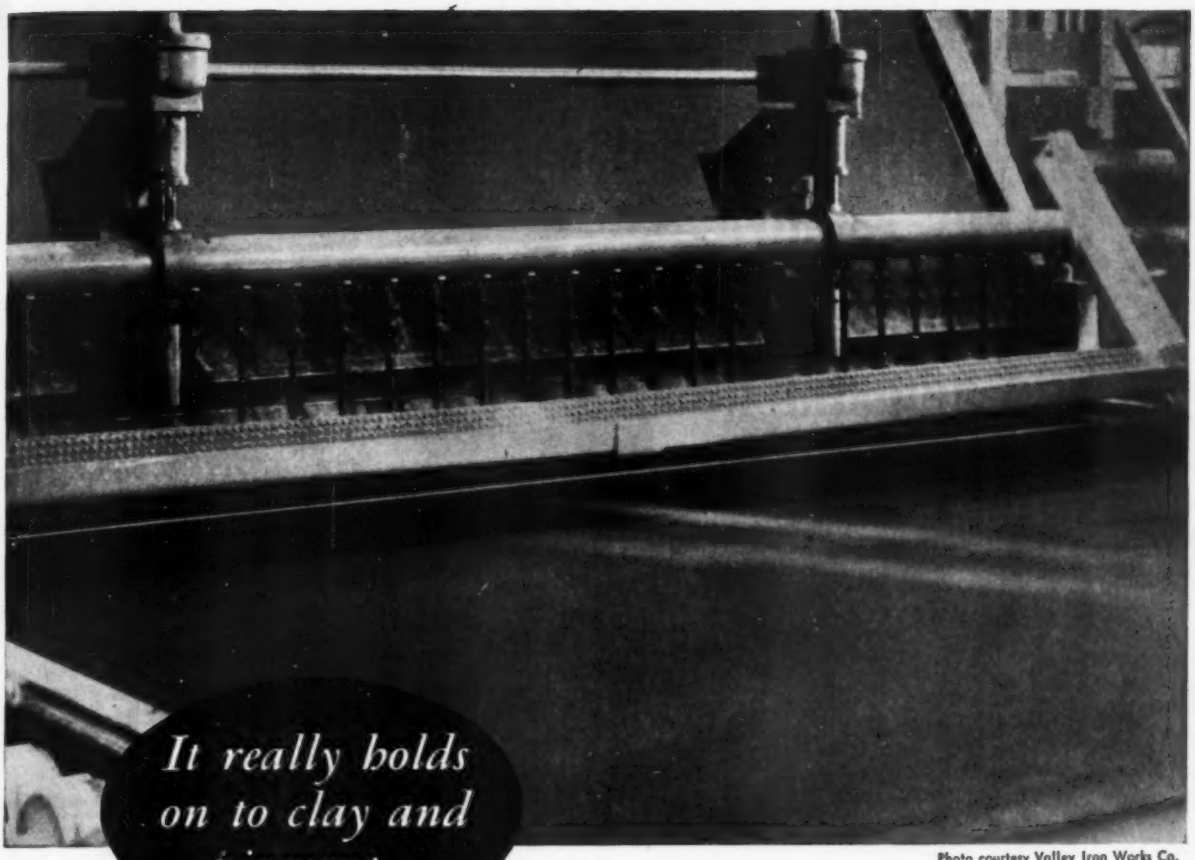
AS EARLY AS 1389 rules governing the sizes, weights and prices of the different grades of paper sold in Bologna, Italy, were engraved on marble and put on public display close to tablets showing the country's standard measures.

Odd Bits

The mediaeval Persian word for paper-KAGHAD-adopted by the Arabs, derived from KAGH, meaning "noise"——referring probably to the racket made by paper mill hammers or stampers



FRENCH paper-makers of the mid-1700's considered that rags rotting in stone vats were ready for their use when mushrooms began sprouting!



It really holds on to clay and pigment...

Photo courtesy Valley Iron Works Co.

One of the three big reasons why papermen prefer Swift's new process Glue

Yes, many successful book paper producers can tell of the unusually high retention of clay and titanium pigment achieved with Swift's new process Glue as flocculating agent.

Made by an exclusive process that assures a glue of exceptional purity and uniformity—Swift's new process Glue promotes greater retention of fibre and filler on the screens. Prevents the loss of valuable clays and titanium pigment in white water. Because it is a colloidally active water soluble animal protein, Swift's new process Glue helps in the even formation of the sheet.

Performance is economical, too. Works in low concentrations . . . requires no expensive agents in solution. Easy to prepare . . . easy to handle . . . non-foaming!

Check these reasons, too!

● **High Recovery in Flotation-type Save-all Systems!** Clearer effluents are obtained with Swift's new process Glue, thanks to its great ability to "flock" fibres and fillers. Economical and easy to use . . . produces consistently good results.

● **Higher Pick Test!** Swift's new process Glue is highly efficient in the production of paper that requires increased Pick Test.

As a partial replacement for starch in machine coating, it has shown greater film forming properties and tensile strength than a total starch solution.

Call **SWIFT** first for **GLUES**

SWIFT & COMPANY
Adhesive Products Department
Chicago 9, Illinois

This offer expires Feb. 28, 1953

Please send your 100-lb. introductory shipment of Swift's new process Glue at the quantity price, to be tested for use in our operations. We understand, if not fully satisfactory, it may be returned for credit at your expense.

*Name*_____ *Title*_____

*Firm Name*_____

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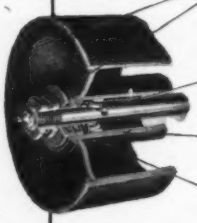
Why LINK-BELT IDLERS require minimum lubrication and adjustment

CHIP-HANDLING 45° IDLER



CUTAWAY OF "100" ROLL

Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.

Precision roller bearings maintain alignment.

Large grease reservoir prolongs lubrication intervals.

Grease-in-dirt-out, cartridge type unit seal preserves lubricant. No springs, no loose parts, no sliding metal-to-metal contact.

By minimizing maintenance . . . holding "down-time" to a new low . . . reducing power requirements—Link-Belt Roller Bearing Idlers save you money. By standardizing in design, Link-Belt offers the famous chip-handling 45° Idler at a cost lower than you'd expect.

Link-Belt makes a complete line to meet every requirement—standard and heavy-duty 20° troughing, impact-cushioning, belt training and flat belt idlers in a wide range of roll diameters and belt widths.

Remember, too, Link-Belt offers a complete line of other belt conveyor components—all types and sizes of take-ups, pulleys, trippers, back-stops and drives. Coupled with our broad belt conveyor engineering experience, this assures you of the right equipment for your handling requirements.

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12,542 **ROLLER BEARING IDLERS**

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

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FABRICATED SCREEN PLATES

for High Plate Capacity – Long Plate Life

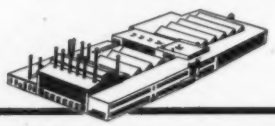
"Hardy" fabricated screen plates, made by Magnus of chrome-nickel-steel or inconel, have a high-strength, thin sheet design that's specially engineered for *maximum flow*. About 40,000 of these plates are now in service, with performance records that prove these three important advantages:

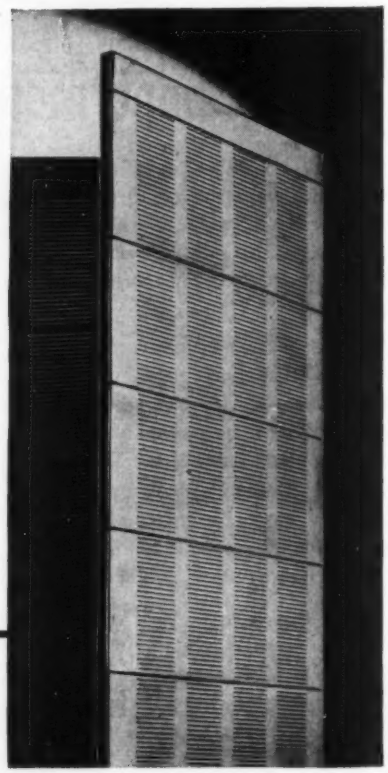
1. **Increased Plate Capacity.** The thin sheet eliminates relief milling, and with recommended arrangement, substantially increases capacity per plate.

2. **Longer Life.** Slots remain sharp, side walls highly polished for the life of the plate. There's greatly improved corrosion resistance, too.

3. **High, Sustained Yield.** Fabricated screen plates assure consistent, uniform quantities of cleaner pulp. This means improved production at reduced operating costs.

Complete information is yours on request. Or if you like, we'll gladly have an engineer call.





MAGNUS METAL CORPORATION, *Fitchburg, Massachusetts*

Metalworkers for the Paper Trade

SCREEN PLATES: BRONZE, CHROME-NICKEL-STEEL, AND INCONEL
VALVES: GATE, SWING CHECK, BLOW, GLOBE, ANGLE AND "Y"

The Paper Industry Association News

PANEL MEMBERS at the Tappi Corrugating Conference were (l to r) V. V. Vallandigham of Potlatch Forests, Inc.; K. W. Max of Robert Gair Co., Inc.; H. T. Scordas of Union Bag & Paper Co.; A. F. Sperling of Downing Box Co.; Burt Mendlin (program chairman) of Cornell Paperboard Products Co.; C. R. Vander Meulen of Penick & Ford Co.; F. E. Skiver of American Boxboard Co., and W. R. Tobin (moderator), also of American Boxboard

Corrugating Problems Spotlighted at Milwaukee Conference

CALLED "BEST YET" by many of the 215 who attended, the recent Fall Corrugating Conference at Milwaukee featured discussions of various problems in the corrugating field. Staged at the Schroeder Hotel, the meeting was jointly sponsored by the corrugating containers committee of Tappi and Tappi's Chicago Section.

Various types of warping and washboarding of corrugating board were described and defined by C. R. Vander Meulen of Penick & Ford Co., who listed their effects on the finished shipping container, including loss of strength, poor stacking qualities, poor printability, and fouling or slowing of the case-sealing machine. He listed as principal causes of warping the unbalanced moisture content of the board and the unbalanced amount or distribution of heat in the machine. Other causes, many of which are tied up with the first two, include unbalanced alkalinity of adhesives or uneven distribution of adhesives, and uneven weight, caliper or furnish of the liner stock. Mr. Vander Meulen declared that most distortion resulting in a normal warp occurs in the hotplate section and advised that adhesive consumption be kept at a minimum to obtain the best board, explaining that solids in the adhesives should be kept at as high a proportion as possible, thus eliminating as much excess moisture as possible and still obtaining a good bond.

Uneven flutes

Speaking on "High-low Corrugations," F. E. Skiver of American Boxboard Co. listed several causes of uneven flutes, among which were too much tension on the web during corrugating, with material tending to "come back," pulling flute height down after corrugating; too much moisture in the rolls of stock; difference in caliper across the sheet; use of steam that is too hot, too high-pressure, and too dry in the preconditioner shower; worn fingers that cause fluttering of web, and poor adjustment of compression springs.

V. V. Vallandigham of Potlatch Forests Inc., discussing problem analysis, declared that if a problem is completely analyzed, the answer or solution is almost always obvious. On the other hand, if one fact is wrong and corrective measures are attempted before the analysis is 100 per cent correct, all too often too many answers or corrections are thrown at the trouble (usually in the form of twisting dials on the machine), and the problem is greatly magnified or complicated with other trouble, rather than being solved. Mr. Vallandigham declared that when an electric light fails to light the intelligent investigation of the problem begins with checking the bulb and proceeds through checking to see if current is coming through the line, the fuse, the inside wiring, the lead-in wires, etc., until the trouble is found. He recommended that, with the fact in mind that all machines have only a reciprocal or rotary motion, or combination of the two, a person seeking to solve a machine problem start at the beginning of the process or operation and go to the end. Applying this thinking to the process of making corrugating board, he remarked that if web speed is doubled, then steam shower in the preconditioner must be doubled to maintain proper moisture content.

Delivery end troubles

Speaking on corrugator delivery tables, A. F. Sperling of Downing Box Co. marked the trend toward batch or pile delivery and the need to increase the efficiency of those devices. He also described causes of trouble at the delivery end, mentioning particularly warped sheets and scrap from the side trim of the printer-slotter. (Mr. Sperling died December 22; see Necrology.)

Maintaining that there can be no compromise between quality of corrugated board and completed shipping containers, K. W. Max of Robert Gair Co. Inc. stressed the present-day demands for higher speeds and improved methods in order to maintain and increase quality, while holding or lowering prices. He said that quality is made principally on the single facer and suggested some possibilities for improving the product at that point, including higher moisture content board and controlled dry heat to eliminate steam-shower application for preconditioning; more positive method for drying board immediately after it leaves the combiner, and employment of a device for continuous measure of caliper.

H. T. Scordas of Union Bag & Paper Co. presented a resumé of the combiner questionnaire. He discussed some of the significant and unusual facts revealed by the survey and explained that the complete details of the tabulations are being printed and will be mailed by Tappi to those companies that participated.

Moderator for the paper sessions was W. R. Tobin of American Boxboard Co.

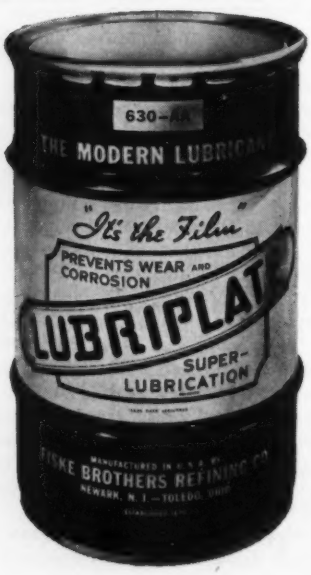
"THIS LUBRICANT SAVED US $2,098·16 IN SEVEN MONTHS"

—says THE BROWN COMPANY
Quality Paper Makers of Berlin, N. H.

"During a seven-month period before using LUBRIPLATE No. 130-AA in the bearing of our Kraft Mill Lime Kiln, we used a conventional oil at a cost of $2,134.00. In the seven months that followed, we used LUBRIPLATE No. 130-AA for initial filling and replacement at the cost of $35.84."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.



Plant tours were made to Cornell Paperboard Products Co., Downing Box Co., and Gaylord Container Corp.

First Semi-Annual Meeting Held by Bag & Cover Group

The Industrial Bag and Cover Association gathered for its first semi-annual meeting November 14 and 15 at the Blackstone Hotel, Chicago. Presiding at the various programs was H. C. Davis of Bemis Bros. Bag Co., president of the Association.

An entire session was devoted to an informal discussion of proposed rules for an industry-wide trade practice conference, for which the industrial bag and cover industry has made application to the Federal Trade Commission. The discussion was led by Wilbur W. Sacra, representing the FTC; Albert E. Sawyer, counsel to the Association, and Philip O. Deitsch, Association Administrative officer.

Among other topics featured at the two-day gathering was the industry's 1953 educational and promotional plans, which when adopted will attract the attention of several unexplored and undeveloped markets that the industry believes it can serve effectively.

Analysis of Cellulose Fibers Featured at Empire State Tappi

The application of two new techniques to the analysis of cellulose fibers was described recently by Dr. Herman Mark, authority on high-polymer chemistry, as he addressed the December meeting of the Metropolitan District, Empire State Tappi. The gathering, attended by 79 members and guests, was held at Fraunces Tavern, New York, N.Y.

Dr. Mark described applications of ultra-violet and infrared spectroscopy to specific localities in the cell wall. These studies, he said, have shown that the lignin in wood is located principally at the outside and between the individual cells. It was also shown that cellulose in the outer wall of wood cells contains more carboxy groups than the cellulose towards the center of the fiber.

The electron microscope has shown that the outer wall of the fiber is actually a fabric-like structure made of cellulose fibrils, each 80 to 100 angstroms in diameter. The inner wall of the fiber apparently consists of cellulose fibrils in more or less random order. Based on these observations, Dr. Mark likened the cellulose fiber to a silk stocking stuffed with balls of cotton.

The speaker explained that the pulp refining process consists of shredding the fabric-like outer wall so that loose strands of the inner wall are allowed to protrude and unite with fibrils from other fibers to form a sheet of paper. In his opinion, Dr. Mark continued, the application of these two new techniques—electron microscopy and ultra-violet-infrared analysis — to wood and paper technology has barely started. As research progresses, it is the responsibility of every paper technologist to seek ways of applying the results to the improvement of papermaking.

Northeast Forum Holds First Industry-Wide Meeting

The role of the foreman in community relations was to be the topic for discussion at the first industry-wide meeting of the Northeast Community Relations Forum January 15 at the Lafayette Hotel in Portland, Maine. The Forum, which is comprised of mills in Maine, New Hampshire and Vermont, is one of various similar groups sponsored by APPA in cooperation with its community relations committee.

Members of the panel discussing the foreman's part in community relations were to be J. H. Groves, training director for Union Bag & Paper Corp., Savannah, Ga. (moderator); Lee J. Clardy, personnel director of P. H. Glatfelter Co., Spring Grove, Pa.; W. M. McFeely, industrial relations director for Riegel Paper Corp., New York, N.Y.; Francis Pope, assistant to the president of The Mead Corp., Chillicothe, Ohio, and A. S. Anderson, director of general industrial relations, Champion Paper & Fibre Co., Hamilton, Ohio.

Paper Mill Power Subject of Joint Ohio Meeting

The importance of the proper layout of paper mill electric systems was emphasized at the joint November meeting of Ohio Tappi and the Miami Valley Division of the Superintendents Association. Addressing 212 members and guests, H. B. Thacker, distribution engineer in the electric utility department of Westinghouse Electric Corp., declared that the initial electric distribution system in any given plant will account for between 2 and 10 per cent of the total cost, depending on how important the management considers certain factors.

Among these factors are (1) reliability with respect to time and duration of outages; (2) flexibility, or ability to handle growing loads economically; (3) voltage regulation; (4) efficiency, which dictates that losses in the system be reduced to a minimum; (5) low upkeep cost, and (6) the initial cost, which should be considered after the above factors in order to determine whether the final layout meets all specifications.

The basic elements of system planning, according to Mr. Thacker, include, first, a knowledge of the loads and load locations prior to drafting the plant

layout. Equipment becomes ineffective with one distribution system failure due to improper design, and in a paper mill the failure of one piece of equipment or one part of the distribution system shuts down the entire mill if service is interrupted even for a fraction of a minute.

$2,000 per hour

If the paper mill goes down, the speaker continued, production time loss may be several hours. A conservative estimate for the average loss for each shutdown is $2,000 per hour, and it does not take many such stoppages to pay for a more reliable distribution system.

This has led electrical manufacturers to develop the use of the industrial network protector, with which it is often possible to reduce power failures on distribution systems to a minimum. The primary selective radial system with two primary circuits has the highest over-all rating based on the six considerations to be made in selecting distribution systems, according to Mr. Thacker.

Even if a paper mill has the latest and best equipment, he concluded, such as totally enclosed motors and a high interrupting capacity circuit breaker, an inadequate electric distribution system can cripple operations and result in heavy losses.

Stream improvement discussed at December Ohio meeting

Stream improvement was the general theme of the December meeting of Ohio Tappi, which was held at Hamilton. C. M. Conner of W. C. Hamilton & Co., Miquon, Pa., described the problems he had encountered in determining what types of waste could be handled by certain types of equipment used to treat effluent from the Miquon mill, which has seven fourdriniers making fine paper.

The speaker showed color photographs demonstrating equipment construction and certain operating conditions that had been encountered. The materials that cannot be treated successfully before the water is returned to the river, Mr. Conner declared, are segregated and dewatered and hauled by truck to lagoons.

It was announced that the February 10 meeting of Ohio Tappi will be at the Manchester Hotel in Middletown. Francis J. Curtis, vice president and a member of the board of directors of Monsanto Chemical Co., will be the principal speaker.

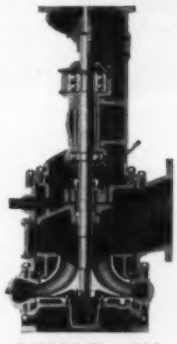
Opacity Featured at Kalamazoo Tappi

Knud Somme, head of the Swedish technical association that is the counterpart of Tappi, was guest of the Kalamazoo Section at its November meeting. Mr. Somme was introduced by Richard

You save space with this vertical Goulds STOCK PUMP

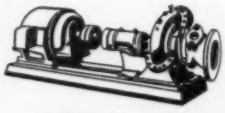
Where space is at a premium, you'll find the Goulds Fig. 3115 the ideal pump for paper stock transfer. Because of its vertical design, it requires a minimum amount of floor space.

Simple, durable construction assures long service life and easy maintenance. Its readily accessible rotating element can easily be removed without disturbing suction or discharge connections. Large, direct passages permit free flow of heavy stock—eliminate air-binding. Ample flushing and drain connections, both in casing volute and in base, provide easy cleaning. This pump is available with capacities up to 2000 G.P.M. Heads up to 180 ft. Complete information is contained in Bulletin 723.2. Send for it today.



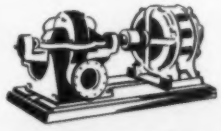
GOULDS Fig. 3115
Backwall ejector vanes on impeller prevent binding of stock behind the impeller . . . also give hydraulic thrust balance.

Other Dependable GOULDS Pumps for the Paper Industry



GOULDS Fig. 3105
Heavy duty, open impeller horizontal centrifugal pumps designed for handling paper stocks. Capacities up to 4000 G.P.M. Heads up to 220 ft. Send for Bulletin 723.1.

GOULDS Fig. 3705
Stainless steel pumps for handling acid and alkaline liquors. Capacities up to 600 G.P.M. Heads up to 160 ft.



GOULDS Fig. 3450
These double-suction, single-stage Goulds centrifugals will handle up to 15,000 G.P.M. Heads up to 500 ft. Ask for Bulletin 721.2.

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THE all-purpose GL-2 Laminator uses materials direct from parent rolls and rewinds, after laminating with either hot or cold glues and pastes. The machine is so designed that each operating assembly can be readily changed to handle the ever-growing list of new laminants and materials. Completely flexible, it can be rearranged for longer sheet leads . . . new assemblies added . . . or old ones subtracted. Standard 60-inch unit has one hot or cold dryer and is equipped with paste or glue applicator. An asphalt applicator may also be added. Provisions are made for by-passing the sheet so that either of the two applicators can be used with equal facility. Additional drying units can be added to speed production by faster sheet curing if desired. Similar laminators are made for use with wax, crystalines and hot melts. Rewinders and backstands of various types can be furnished. Write for complete details and specifications.

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Trelfa of Watervliet Paper Co., the plant he was visiting at the time on a tour of United States paper centers.

Principal speaker at the meeting was William R. Willets, Titanium Pigment Corp., who discussed opacity and the factors that affect it. Many factors were outlined, including the basic pulp used, its water content, and the pressing it receives. The inherent brightness of a sheet, he declared, has a tendency to increase opacity, while dullness tends to decrease it—other things being equal.

Pigments and fillers have an inclination to increase opacity, as do blue or green coloring. On the other hand, yellow and blue tints tend to decrease it. However, calendering the normal sheet cuts opacity very little, the speaker declared, about two-tenths of a degree on the mechanical scale. The eye, he said, in spite of improvements in mechanical testing methods, is still the boss when it comes to a customer's judgment. Presiding at the meeting was A. T. Luey, section chairman.

Albert Award Announced by Delaware Valley Tappi

The executive committee of the Delaware Valley Section of Tappi has announced the second annual Albert Award competition. Named for E. J. Albert, a founder and past chairman of the section, the contest is sponsored to give the younger members of the paper industry an opportunity to gain experience and recognition.

The competition consists of the presentation of papers on original technical work by young men actively engaged in the industry. Since the primary purpose of the competition is to benefit those just entering the field, those in supervisory positions or those who have gained maturity through considerable experience—such as technical directors, chief chemists and experienced research chemists—are not to be considered eligible. The executive committee of the section, however, has the authority to determine eligibility in individual cases.

The participant may choose his own subject, which is to concern some technical aspect of the manufacture of pulp and paper and be associated with some operation, process or investigation in which he has been interested in the course of his employment. The sponsoring section intends to publish all suitable Albert Award papers in the various trade journals and requests that clearance be obtained from the entrant's employer

In judging the papers for presentation of the $50 award, the following points will be considered: (1) planning, resourcefulness and originality; (2) organization, and (3) presentation. The board of judges will be appointed by the Delaware Valley chairman prior to April 23, the deadline for entering the contest. Papers should be submitted to the secretary of the section, P. E. Nethercut, c/o Scott Paper Co., Chester, Pa. Further information can be obtained by writing the award chairman, John Macadam, c/o National Vulcanized Fibre Co., Yorklyn, Del.

Sixth Alkaline Pulping Conference Held at Mobile, Ala.

Problems dealing with sulfur and soda recovery, recovery room operations, reduction of kraft mill odors, deterioration losses in stored pulpwood, burning of wood refuse, evaluation of bleached kraft pulp, current re-causticizing practice, and kraft mill effluents were subjected to intense scrutiny at the Sixth Tappi Alkaline Pulping Conference held at Mobile, Ala., on November 12-14.

Sulfur and soda recovery

Discussing the application of submerged combustion evaporation in the pulp and paper industry, William I. Weisman, Ozark-Mahoney Co., listed advantages and limitations of this method in black liquor evaporation. Its outstanding advantage is the direct transfer of heat from the product of combustion to the solution being evaporated, without using a heat transfer medium such as steam, or having to transfer heat through surfaces such as boiler and evaporator tubes. The gases, leaving the burner in the form of many small bubbles, in themselves provide a tremendous surface for heat transfer. The method is particularly applicable to solutions with high scaling characteristics, high viscosity, high boiling points, and corrosive properties.

The method's limitations arise from the necessity of using gaseous fuel or relatively expensive oil and its inability to perform as a multiple effect evaporator.

Submerged combustion, Mr. Weisman suggested, should be considered for certain specific situations, as for instance, in plants with insufficient steam generating capacity. The utilization of submerged combustion in black liquor evaporation, according to Mr. Weisman, is not economical for the concentration of black liquor up to 45 or 50 per cent solids content, when comparing it with conventional multiple effect evaporation. The method may, however, have marked advantages in concentrating black liquor beyond the 45 to 50 per cent solids content, to 65 per cent solids for instance, and thus lead to more economical operation of the chemical recovery furnaces.

In the burner manufactured by Ozark-Mahoney, air and gas are mixed prior to their introduction to the burner. Combustion of the air-gas mixture is prevented by maintaining its velocity in excess of that of flame propagation. In the burner itself, the mixture's velocity falls below the flame velocity so that combustion can take place.

J. E. Vassie, International Paper Co., Camden, Ark., discussed the use of sulfur in kraft pulp mills. Specific heat data of sulfate black liquor were presented by R. L. Harvin and W. F. Brown, University of Florida, and the effect of sulfidity on bleached sulfate pulp strength was reviewed by M. B. Pineo, Brunswick Pulp & Paper Co.

A panel consisting of C. L. Durkee of D. J. Murray Mfg. Co., W. J. Darmstadt of The Babcock & Wilcox Co., Frank W. Hochmuth of Combustion Engineering, and C. L. Tomlinson, Howard Smith Paper Mills Ltd., dealt with the use of flue gases for black liquor evaporation.

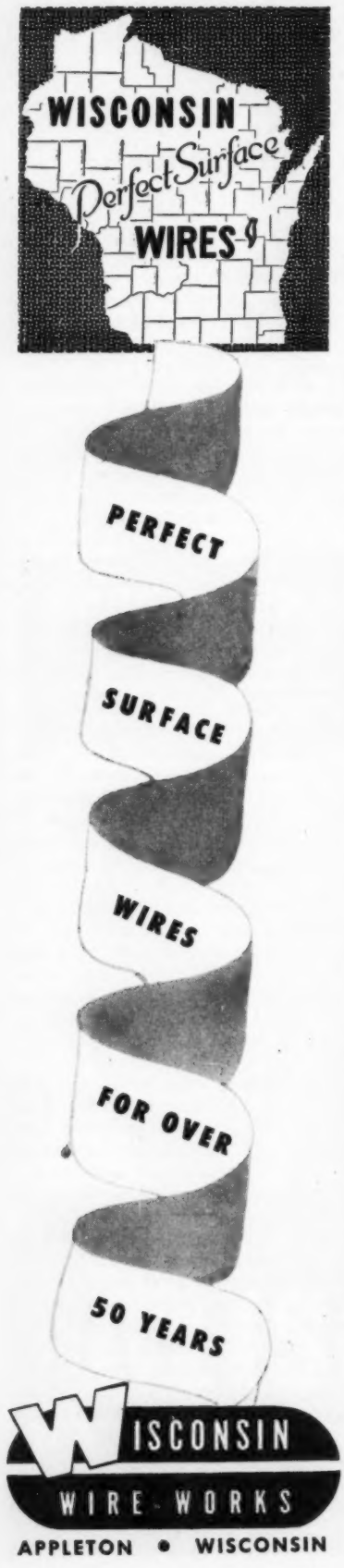
General recovery room operation

New developments in recovery unit design were reviewed by Frank W. Hochmuth, Combustion Engineering. Mr. Hochmuth traced the evolution of the present-day CE-S recovery unit, showing a general trend toward installation of higher capacity units. Prior to 1937, the largest capacity available was 390,000 pounds of dry solids per 24 hours. Today, there is at least one unit in operation with a capacity of 1,140,000 pounds (or 38 tons) of dry solids per 24 hours. Concurrent with the development of large capacity recovery units, there was a definite trend to single unit installations in mills having capacities up to 400 tons. This trend is due to the considerably smaller capital investment necessary for the single unit installations and the fact that cost of operation and maintenance of a single unit is about half that of two smaller units.

The rearrangement of heating surfaces in the super-heater is a recent development in recovery unit design. By arranging the tubes in the form of a platten, 90 per cent of the spacers, which are largely responsible for collecting slag, were eliminated. The complete platten super-heater was installed in one of the southern mills in 1952.

A new black liquor spray gun permits the heating of black liquor to a temperature slightly above its boiling point, which results in partial flash drying of the black liquor in the furnace.

New developments in recovery fur-



nace design were also reviewed by W. J. Darmstadt, The Babcock & Wilcox Co. J. R. Upson and T. J. Thompson, Union Bag & Paper Corp., Savannah, Ga., discussed instrumentation of recovery furnaces; H. O. Teeple, International Nickel Co., dealt with corrosion problems in recovery operations, and J. L. Brown, Brunswick Pulp & Paper, discussed the liquor cycle operation from the operator's viewpoint.

A panel discussion on recovery furnace operation was led by Wilbur L. Orr, St. Regis Paper Co., Pensacola, Fla. George H. Whiteside, Container Corp. of America, Fernando, Fla., and W. G. Reynolds, Gulf States Paper Corp., Tuscaloosa, Ala.

Reduction of kraft mill odors

E. R. Woodward, Mathieson Chemical Co., discussed the possible application of chlorine dioxide in pulp mill odor control, pointing out that chlorine dioxide had been used quite effectively in eliminating odors in fish processing plants. The action of chlorine dioxide is that of oxidation without chlorination of the odor-causing substances, while the conventional chlorine treatment results in substitution products.

Describing a system of odorimetric evaluation of sulfate mill odors, Walter C. Meuly, Organic Chemicals Department, E. I. DuPont de Nemours & Co. Inc., compared scent values of various odoriferous compounds with that of Masking Agent A. Thus, methyl mercaptan has a scent value of 200×10^6; dimethyl sulfide, 100×10^6; hydrogen sulfide, 250×10^6, and masking agent A, 33×10^6. These figures are useful when attempting to mask malodors with pleasant-smelling substances.

Two other papers dealing with masking mill odors were prepared by Breckinridge K. Tremaine of the Organic Chemicals Department of duPont, and Ben F. May, Gulf States Paper.

The design of chimneys for dispersing odors into the atmosphere was explained by F. L. Cate, Rust Engineering Co., Birmingham, Ala. Mr. Cate said one degree temperature rise of chimney gases is equivalent to a two-foot chimney length. For good odor dispersion, the velocity of the chimney gases should be about 36 feet per second, and the maximum velocity limited to 42 feet per second.

General session

Ralph M. Lindgren, Forest Products Laboratory, Madison, Wis., described deterioration losses in stored southern pine pulpwood and showed the correlation that exists between such losses and the specific gravity of the wood. The principal effect of prolonged storage, Mr. Lindgren said, is a decrease in brightness and a somewhat greater alkali consumption of sulfate pulps. Mr. Lindgren also discussed current practices of reducing storage losses of pulpwood.

Otto D. Lorenzi, Combustion Engineering Superheater Inc., described recent furnace designs for turbulent suspension burning in which wet wood and other similar types of cellulose refuse are used as primary fuel. He also discussed some of the more important characteristics of turbulent suspension burning.

Speaking on kraft mill effluents, A. W. Pesch, International Paper Co., Mobile, Ala., drew attention to many encouraging results in solving the pollution problem. A pilot plant built by Macon Kraft Co., has experimented with forcing compressed air into the waste matter, seeding its sewage plant sludge, and adding nitrogen and phosphates to encourage growth and activity of microorganisms. Mr. Pesch warned, however, that researchers should proceed cautiously in order to avoid wasting natural resources and company capital on treatment plants that may soon become obsolete.

D. C. Gillespie, The Dorr Co., Stamford, Conn., spoke on current recausticizing practices, and R. L. Lewis and J. J. Higgins, The Ohio Boxboard Co., Rittman, Ohio, presented a paper on the evaluation of bleached kraft pulp for paperboard manufacturing.

Plant visits on November 14 to the Mobile mill of International Paper, and its new research laboratory, and to Hollingsworth & Whitney Co., concluded the Sixth Alkaline Pulping Conference.

Three Speakers Discuss Maintenance at Michigan Supts.

Three phases of the problem of paper mill equipment maintenance were presented to members of the Michigan Division of the Superintendents Association at the November meeting at the Hotel Harris in Kalamazoo. About 85 members and guests were present and took part in the general discussion, which was under the direction of Harvey Hartman, American Boxboard Co., chairman.

Lee Bunde of Michigan Carton Co. stressed the importance of good housekeeping as a safety factor. It is the clean, safe mill that in general is the mill that operates at a profit, he declared.

Fred TerBurgh of Kalamazoo Vegetable Parchment Co. advised a careful scheduling of repairs. His idea is that keeping equipment in proper condition, rather than waiting until it deteriorates, makes for regular and efficient production.

Edward Zaub of American Boxboard, Grand Rapids, discussed maintenance and costs. He asserted that while main-

tenance is carried on, generally under a fixed budget, proper organization of working capital—its inventory of supplies—is a vital part of the organization's efforts to keep costs under control.

Sizings Evaluated at Chicago Tappi Meeting

"Paper and Board Sizings and the Qualities They Impart" was the topic discussed by Arthur C. Dreshfield of the Chicago Testing Laboratory as he addressed the November meeting of Chicago Tappi.

Following a technical definition of sizing, the speaker traced its history and stated that the first method of sizing paper is credited to the Orientals, who found that their handmade papers had to be covered with a thin coating of pulverized gypsum in order to make it possible to use them for writing. He declared that as early as 700 A.D. the Chinese sized their paper by dipping it in a starch solution prepared from plant lichens or rice. Animal glue was substituted for starch as a sizing agent in England in the 14th century; and in 1807 Illig, a German, first conceived a rosin as a base material for engine sizing, and rosin sizing has been the backbone of sizing since that time.

Sizing is divided into three classifications, according to Mr. Dreshfield: engine sizes, tub sizes, and calender sizes. Rosin size is the fundamental engine size, and all grades to be effective must be precipitated onto the fiber with papermakers' alum. Alum is specific, as no other acid or acid salt is universally effective as a precipitant. Rosin size converts blotting papers, waterleaf and mimeograph paper to writing grades, the speaker continued. There are, however, definite limits to the capacity of rosin size to improve water resistance. As a general rule, the more impure the fiber the easier it is to size, the speaker pointed out. He further stated that the addition of small amounts of rosin size are more beneficial than large dosages, most grades being adequately sized with from 1 to 3 per cent rosin.

Supplementary chemicals

Mr. Dreshfield stated that the most common supplementary chemicals used in beater sizing are the petroleum hydrocarbon waxes, asphalt emulsions, and vinsol resin. These materials impart varying degrees of water resistance and limited degrees of oil resistance and lessened water absorptiveness.

Two classes of wet strength resins are in common use today, one of them being the melamine resins and the other the urea-formaldehydes. These are added to the stock while still in suspension, in amounts varying from 0.5 to 3 per cent of the stock.

Silicate of soda and starch are supple-

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SIZINGS were discussed at Chicago Tappi's November meeting by Arthur C. Dreshfield

mentary sizing agents for use as beater additives, Mr. Dreshfield continued. Starches add to the physical properties of the sheet, reduce fuzz and improve erasability, feel and rattle, and produce a smoother calendered sheet. Silicate of soda is added to produce increased stiffness and rattle in such grades as Bristols, card and tag stock, and in some instances in meat tray boards, test liner, and corrugating mediums.

The speaker next discussed the tub sizing agents and stated that all the sizing agents used in engine sizing are potential tub sizing chemicals. The application of materials at the size press makes for easier control of applied weights. Among the tub sizing materials are glue, casein, alpha protein, corn protein, soya bean flour, starch, wet-strength resins, wax emulsion, silicates, phosphates, antimony compounds, natural and synthetic latexes, synthetic resin emulsions, methyl cellulose, carboxymethyl cellulose, kelgins, alginates, Irish moss, glycerine, glycols, dextrine, sugars, complex metallic organic compounds such as stearato chromic chloride, the silicones, preservatives, moldicides, and fungicides. Mr. Dreshfield then described the specific properties that these materials impart to paper.

In discussing calender sizes, the speaker stated that these are limited essentially to the application of small amounts of water alone, silicates, starches, wax emulsions, corn protein emulsions, kelgin, etc.

Container Needs Analysed at Tappi Fibrous Agricultural Residues Meeting

STANDARD TESTS such as crush resistance, bursting strength, puncture resistance, etc., as carried out in accordance with Tappi and ASTM procedures, do not always indicate what fiber container will do under actual conditions. This was the view expressed recently by C. O. Smith as he addressed the Tappi Fall Conference on Fibrous Agricultural Residues, which was held at the Northern Regional Research Laboratory at Peoria, Ill. Mr. Smith is industrial engineer for Hiram Walker & Sons, Inc., Peoria.

The speaker referred particularly to the high humidities generally prevalent in packaging and storing distillery products. He pointed out that while he was not using straw corrugating in whiskey shipping containers at the present time, the Tappi and ASTM specifications are based on performance rather than on a preference for any type of fiber. Hiram Walker would prefer to use other materials that would meet their specifications, so that they would not be dependent on the type of fiber for their containers.

Straw and hay standards

At the opening session, W. H. Hosterman, assistant chief of the Standards Research and Testing Division, Production and Marketing Administration, U.S. Department of Agriculture, discussed "Straw and Hay Standards." He declared that the present straw standards were made effective January 2, 1943, and were set up at the request of the U.S. Army for use as animal bedding. Mr. Hosterman pointed out that with the advent of the combine for harvesting grain, the character of the straw now available is different from that obtainable when the standards were set up, particularly with regard to length of straw, chaff content, etc.

Explaining briefly the way in which the Standards and Inspection Service was set up, Mr. Hosterman said that if the industry desires to have an inspection service for industrial straw, the Department of Agriculture would be glad to cooperate, but that the demand for such service would have to come from outside the Department.

At the conclusion of Mr. Hosterman's address, a roundtable discussion based on more than 30 questions submitted by the strawboard industry was held on the topic, "Straw Specifications and Grading."

On the subject of *procurement* most of those present agreed that the best means of controlling deliveries was to set up such control at the source, rather than to request the railroads or truckers to space their deliveries of straw. *Baling* was discussed at some length, with the consensus being that the optimum bale size obtainable from present balers that can be handled with ease is 16″x18″x38-42″. Some indicated a preference for the 48-inch bale, but most agreed that a standard bale that length would tend to buckle. It was agreed that the density should be approximately 10 pounds per cubic foot, but many claimed that this is difficult to attain at the present time, mainly because many of he balermen are paid by the bale rather than by the weight of the straw baled.

Practically all the straw buyers in the industry use 10 or 12 per cent as the average *moisture content* of the air-dry straw. The optimum point of density was found to be approximately 10 pounds per cubic foot. It became apparent during the discussion that no one docks the farmers or straw sellers for *chaff* if the grain has been combine-harvested. Practically all in the group agreed that in combine-harvesting the chaff in the straw is generally under 5 per cent. According to most of those present, most of the strawboard mills allow 5 per cent weeds. A bright yellow was agreed on as the most desirable *color* to indicate fresh, sound straw.

Most of the delegates to the conference preferred wheat and rye straws. Some stated that they would not accept rice straw under any circumstances. Others declared that it is impossible to obtain wheat straw without getting some oat straw mixed with it. The consensus was that the preferred straws—in order of decreasing usefulness for strawboard production—are wheat and rye, oats, rice, and barley.

Foreign guest

Included in the group attending the meeting was a delegation of 12 representatives of the Netherlands straw and paperboard industries, who are visiting the Uniited States under the auspiices of the Mutual Security Agency. The group was led by J. Koski, project manager in the Productivity and Technical Assistance Division of MSA. The delegation consisted of four executives, four technical men, two operators, and two union officials.

The conference was opened by Dr. R. T. Milner, director of the Northern Regional Research Laboratory. He pointed out that this was the fifth meeting of the group in Peoria and discussed the scope of the work at the laboratory, with particular attention to fields of work other than agricultural residues and pulp and paper.

The meeting ended with a tour of the

laboratory. S. I. Aronovsky of the laboratory is chairman of the Fibrous Agricultural Residues Committee of Tappi.

The Joint Fall Meeting
of the Southern and Southeastern divisions of the Superintendents Association will be held at the Edgewater Gulf Hotel in Edgewater Park, Miss. The tentative dates for the gathering are October 28-29.

The 1953 Spring Meeting
of the Pennyslvania-New Jersey-Delaware Division of the Superintendents Association is scheduled for May 15-16 at the Stacy-Trent Hotel in Trenton, N.J.

Coming Events

TAPPI meetings

Feb. 16-19—Annual meeting, Commodore Hotel, New York, N.Y.
Feb. 20—Lake Erie Section, Hotel Carter, Cleveland.

American Pulp & Paper Mill Superintendents Association meetings

Jan. 22—Miami Valley Division, place to be announced.
Feb. 19—Michigan Division, Hotel Harris, Kalamazoo.
Feb. 25—Miami Valley Division, place to be announced.
March 19—Michigan Division, Hotel Harris, Kalamazoo.
June 9-11—National meeting, Atlanta-Biltmore Hotel, Atlanta, Ga.
May 15-16—Pennsylvania-New Jersey-Delaware Division, spring meeting, Stacy-Trent Hotel, Trenton, N.J.
Oct. 28-29—Southern and Southeastern divisions, joint fall meeting, Edgewater Gulf Hotel, Edgewater Park, Miss.

Other meetings

Jan. 19-22—Plant Maintenance Conference, Public Auditorium, Cleveland.
Jan. 26-30—Dr. John Gaillard Seminar on Industrial Standardization, Engineering Societies Building, New York, N.Y.
Jan. 26-30—Eleventh International Heating and Ventilating Exposition, International Amphitheatre, Chicago.
Jan. 28-30—CPPA Technical Section, Mount Royal Hotel, Montreal.
Feb. 15-20—APPA, annual meeting, Waldorf-Astoria Hotel, New York, N.Y.
Feb. 16-17—Salesmen's Association of the Paper Industry, annual meeting, Waldorf-Astoria Hotel, New York, N.Y.
Feb. 18—Instrument Society of America, New York Section, regional meeting, Hotel Statler, New York, N.Y.
April 26-29—American Institute of Chemical Engineers, joint meeting with the Chemical Institute of Canada, Royal York Hotel, Toronto.

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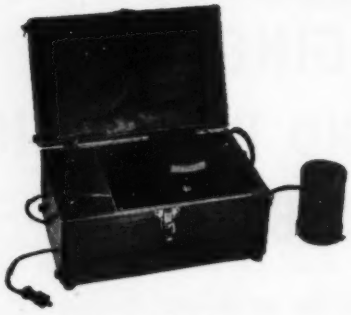

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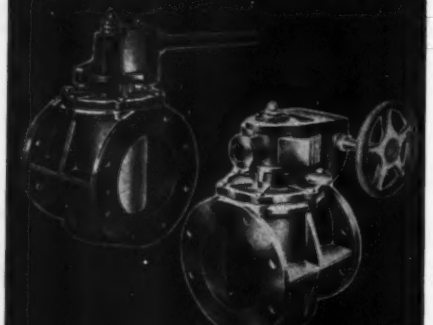

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The Paper Industry Names in the News

Ferner Manages Tyrone Plant Of W. Va., Pulp & Paper

LYNNE FERNER, manager of the Williamsburg, Pa., plant of West Virginia Pulp & Paper Co., has assumed additional duties as manager of the company's Tyrone, Pa., plant, succeeding the late James R. Shea. Mr. Ferner had more than 15 years experience at the Tyrone mill, rising to assistant manager before he assumed the managership of the Williamsburg plant in 1949.

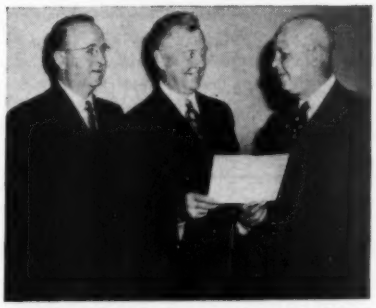
Two other personnel changes have been announced. *HENRY MOOSEKER*, paper mill superintendent at Tyrone, has been promoted to general superintendent in charge of manufacturing at that mill, and *KENNETH H. HUNT*, chief chemist at Williamsburg, has been named technical director of that plant. The new responsibilities assigned the two men will be in addition to their present assignments.

Mr. Mooseker started work for the company in the laboratory at Tyrone in 1940, following his graduation from City College of New York. After serving in the Army, he returned to the Tyrone plant as a technical assistant in the development of machine coated paper. He was promoted to paper mill superintendent in 1950. Mr. Hunt, who received his M.S. degree in 1935 from Bucknell University, joined the company in 1941 as assistant chief chemist at Williamsburg. He was advanced to chief chemist in 1945.

Four Personnel Changes Announced by Hammermill

Hammermill Paper Co. has announced the following appointments: *JOHN C. WILSON* to superintendent of the wood room; *WILLIAM H. KENNEDY* to assistant superintendent of the paper mill; *JOHN STUDENY* to manager of product development, and *ROGER STRAUSS* to assistant to Mr. Studeny.

Mr. Wilson is a graduate of the University of Maine. Joining Hammermill in 1934, he did research in laboratory and engineering and in 1940 became a technical assistant in the sulfite mill. Since 1947, he has been an assistant to the manufacturing superintendent. Mr. Kennedy joined Hammermill in 1949, upon his graduation from New York State College of Forestry at Syracuse University. He had been a staff assistant in the paper mill division.



AN AWARD FOR HIS 25 YEARS SERVICE with Rayonier Inc., is received by Lyall Tracy (right), deputy assistant administrator of NPA, from Clyde B. Morgan, president, while Executive Vice President James T. Sheehy looks on during a silver anniversary celebration held recently in New York City. Forty company employees received similar recognition for 25 years of uninterrupted service.

Mr. Studeny received his M.S. Degree from Syracuse University, and prior to joining Hammermill in 1948, he was connected with the American Writing Paper organization and American Cyanamid Co. He was named supervisor of technical paper sales at Hammermill in 1949 and continued this work when, in 1951, he became acting product development manager. Mr. Strauss joined the research staff of Hammermill Laboratories in July of this year. He received his M.S. degree from New York State College of Forestry, Syracuse University and was employed in technical sales work with Bauer Bros. Co., Springfield, Ohio, before joining Hammermill.

Dr. Kyle Ward Gets New Post At American Chemical Society

DR. KYLE WARD JR., head of the cellulose group at the Institute of Paper Chemistry, Appleton, Wis., has been elected chairman of the American Chemical Society's division of cellulose chemistry for 1953. He succeeds *DR. JOSEPH L. McCARTHY*, head of the department of chemistry and chemical engineering at the University of Washington, Seattle, Wash. *DR. A. J. STAMM*, subject matter specialist at the United States Forest Service's Forest Products Laboratory, Madison, Wis., was chosen chairman-elect; and *E. D. KLUG*, research chemist for Hercules Powder Co., Wilmington, Del., was named secretary-treasurer.

Born in Beaumont, Tex., Dr. Ward received his B.A. and B.S. degrees from the University of Texas and his M.S. degree from George Washington University. He served as an instructor at the University of Texas from 1923 to 1924 and then became a junior chemist in the Department of Agriculture's Bureau of Chemistry and Soils. In 1928 he joined the staff of Hercules Powder Co., Kenvil, N.J., as a research chemist. He received the Ph.D. degree cum laude from Friedrich Wilhelms University in Berlin, Germany, in 1932. Dr. Ward was a research fellow for the Chemical Foundation from 1936 to 1938, returning to the Department of Agriculture in 1938 to become senior chemist at the Southern Regional Research Laboratory, New Orleans, La. He was head of the cotton fiber division there until coming to the Institute of Paper Chemistry staff in 1952. He has served as a consultant to the Joint Chiefs of Staff and is an associate editor of "Textile Research Journal." He is a former chairman of the American Chemical Society's Louisiana section.

Crown Zellerbach recently announced the following supervisory changes to become effective some time early in 1953: *WILLIAM HART*, San Francisco headquarters, will become secretary of the newly formed executive development committee; *E. A. "MIKE" PAUL*, Camas, Wash., division, will be promoted to general supervisor, with headquarters at San Francisco; *HAROLD F. CARPENTER*, Port Angeles, Wash., division, will be promoted to industrial and community relations supervisor of the Camas division.

FRED C. BOYCE, one of the founders and trustee of the American Pulp & Paper Mill Superintendents Association, is making a fine recovery from his recent illness at his home in Wauwatosa, Wis.

DR. E. C. LATHROP, head of the Agriculture Residues Division of Northern Regional Research Laboratory, Peoria, Ill., attended the conference on pulping hardwoods and non-woody plants under the auspices of the Food and Agriculture Organization of the

SEVENTEEN NEW MEMBERS, who have completed 25 years of service with Fort Howard Paper Co., Green Bay, Wis., were welcomed into the company's Quarter Century Club at its fifth annual banquet held recently. Those shown are (front row, l to r): August Hochgreve, Alex Nelson, Robert Kramer, Eugen Berndt, Julia Roloff, Edward Soletske, and Merle Crabb; (back row) William K. Strehlow, Harold Nelsen, Frank Servais, Frank Dietzler, Michael Mikolajcyk, Albert Evrard, Clarence Philips, Arnold Zelzer, Joseph Dequaine and Bion Delamater.

United Nations in Rome, Italy, December 3 to 13. He then visited a number of research institutes and paper mills on the continent and in England that use straw.

HAROLD L. PECKHAM has joined Oxford Paper Co. as assistant in product development. He formerly was technical director of Paper Corp. of the United States, and prior to that was vice president and general manager of the Hartford branch of Green & Low Paper Co. He had previously served with Hammermill Paper Co. for 25 years as chief of their paper and color laboratory and on their sales promotion staff.

JOHN J. ZIMA has been appointed secretary-treasurer of the Newsprint Service Bureau. He formerly was assistant secretary-treasurer.

C. G. EUBANK, mill manager for Kimberly-Clark Corp. at Memphis, Tenn., was honored recently by that company for completing 25 years with the firm. He started in the personnel department and was transferred to Memphis in 1946.

Pacific Mills Ltd., Vancouver, B.C., has appointed *R. GOURLEY* assistant to the president and *A. R. WEBB* acting plant manager of the Vancouver converting plant.

Rolland Paper Co. Ltd. has elected the following officers: *LUCIEN G. ROLLAND,* president; *MARC ROLLAND,* vice president and manager of mills; *ROY H. ECCLESTONE,* vice president and director of sales, and *ALBERT ROLLAND,* a director.

J. ANGUS OGILVY, Q. C., of the law firm of McMichael, Common, Howard, Ker & Gate, Montreal, has been elected a director of Canadian International Paper Co., Montreal, to fill a vacancy caused by the death last year of George H. Montgomery, K. C.

G. WILLING PEPPER, vice president and director of Scott Paper Co., has been named to head the company's industrial division, succeeding *GEORGE H. SWATEK,* who has resigned.

R. A. McDONALD, executive vice president of Crown Zellerbach Corp., who had been serving temporarily as administrator of the National Production Authority, has returned to Crown Zellerbach.

The Packaging Association of Canada recently elected the following officers for 1953: *F. C. LENNOX,* general sales manager of Sommerville Ltd., London, Ont., president; *H. S. ROMANI,* Christie, Brown & Co., first vice president. *LYLE D. RICHARDSON,* Shipping Containers Ltd., Montreal, second vice president, and *F. C. HAYES,* Container Statistics, Ltd., treasurer.

HENRY SEEBOTH has been named president of the newly formed Waste Paper Specialties Co., Milwaukee, Wis. *BEN ASMAN* was named vice president and *ROBERT SEEBOTH* secretary-treasurer.

GEORGE A. GRAHAM, of the Institute of Paper Chemistry, was elected president of the newly organized Valley Office Managers Association at its first meeting held recently in Appleton, Wis. *ELMER J. DEPREZ* of John Strange Paper Co., Menasha, Wis., was elected treasurer and *S. J. WARD,* of Nicolet Paper Co., DePere, Wis., publicity chairman.

BUD E. SIMONTON, formerly a plant superintendent for St. Regis Paper Co. in the South, has been appointed superintendent of Chase Bag Co. at Toledo, Ohio.

Three members of the engineering staff of Northern Paper Mills, Green Bay, Wis., who have recently been promoted are: *JOHN E. GOODE* to assistant chief engineer, succeeding the late James E. Martin; *ROBERT L. COWLES* to master mechanic, succeeding Mr. Goode, and *JAMES TIPPET* to chief power engineer, succeeding the late Norris Hildebrand.

COLA G. PARKER, president of Kimberly-Clark Corp., Neenah, Wis., has been appointed a public interest director of the Federal Home Loan Bank of Chicago and will serve the unexpired portion of a four-year term ending December 31, 1953.

Appleford Paper Products Ltd., Toronto, Ont., has named *DWIGHT L. STOCKER* chairman of the board and *E. NORVAL HUNTER* president. Mr. Stocker is president of Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., and Mr. Hunter is vice president in charge of all Canadian operations of KVP.

DR. J. A. HALL, director of the U.S. Forest Products Laboratory, left recently for Rome, Italy, to confer with heads of forest products research institutions in other nations on technical problems underlying world-wide shortages of newsprint and other types of paper. The purpose of this conference, which has been called by the United Nations Food and Agriculture Organization, is to lay the groundwork for world-wide expansion of pulp and paper production—especially in countries where raw materials exist but mills are needed.

Three promotions among the executive staff of Paterson Parchment Paper Co., Bristol, Pa., were recently announced. *J. ARNOLD NEWMAN* was named director of sales production, *WILLIAM LOUDEN* director of product development, and *J. W. GREVE* head of the sales correspondence division, in addition to performing duties as assistant to the wax division manager.

American Paper Co. has announced that *ARNOLD KUNTZ* has been named director of defense packaging to counsel industry in Wisconsin on government packing requirements.

HERMAN G. SCHANCHE, formerly vice president in charge of woods operation for Brown Co., has joined Oxford Paper Co. as assistant in woods operation to the executive vice president. Previous to joining Brown Co., he was with Abitibi Power & Paper Co. Ltd. for 24 years.

G. W. E. Nicholson

S. K. Bradley

R. C. Chandler

F. H. Meendsen

Union Bag Elects Four New Officers

Union Bag & Paper Corp. recently announced the election of the following officers: *G. W. E. NICHOLSON*, executive vice president in charge of manufacturing; *S. K. BRADLEY*, vice president in charge of multiwall bag sales; *R. C. CHANDLER*, vice president in charge of board and corrugated container sales, and *F. H. MEENDSEN*, vice president in charge of sales promotion.

Dr. Stone Joins Staff of Institute of Paper Chemistry

DR. JOHN E. STONE, who was formerly with the National Research Council in Canada, has joined the staff of the pulping and papermaking section of the Institute of Paper Chemistry. His activities will include teaching and research in the fundamental chemistry of pulping reactions.

Born in England, Dr. Stone received his B.S. degree and Ph.D. degree from London University. He was research chemist with Imperial Chemical Industries Ltd. from 1942 to 1943. He became assistant research officer with the National Research Council at Prairie Regional Laboratory, Saskatoon, Sask., where he set up a pilot plant for pulping straw and a laboratory for testing pulp and paper. In addition, he engaged in fundamental research into plant tissues, particularly the biosynthesis of lignin using isotopic carbon.

GEORGE H. WILSON, of Seattle, Wash., is the first student to receive the U. M. Dickey Award presented by the Scott Paper Co. The scholarship was named in honor of U. M. Dickey, of Everett, Wash., vice president and senior director of the company on the West Coast.

Brown Co. Promotes Herr

C. S. "PAT" HERR has been elected vice president in charge of woods operations in the United States for Brown Co., Berlin, N.H. He joined the company as chief forester in 1943 and in 1945 was named resident woods manager.

Mr. Herr received his forestry degree from Pennsylvania State College in 1925 and his graduate degree from Harvard University in 1930. He has served with the U.S. Forest Service in New Hampshire and Pennsylvania and for 12 years was a University of New Hampshire extension forester for northern New Hampshire. Immediately prior to joining Brown Co., Mr. Herr served in Washington, D.C., with the War Production Board on pulpwood production problems. He is now serving as president of New Hampshire Timberland Owners Association and as chairman of the Governor's Forest Policy Committee for New Hampshire.

C. S. Herr

E. C. Uebrick

Uebrick Joins Hoberg As Sulfite Superintendent

EVERETT C. UEBRICK, Woodland, Me., has joined Hoberg Paper Mills Inc. as sulfite superintendent. He replaces *WALTER CHRISTENSEN*, who asked to be relieved because of ill health. Mr. Christensen will continue with the firm in a technical capacity.

A native of Rapid River, Mich., Mr. Uebrick began his career in 1920 as a laboratory technician with Kimberly-Clark Corp. He later held various operating jobs in the sulfite departments of Dells Power & Pulp Co., Consolidated Water & Paper Co., and Port Alfred Pulp & Paper Co. In 1934 he joined Huron Sulphite & Paper Co. as a research chemist, later advancing to chief chemist and technical superintendent of the sulfite mill. In 1950 he joined St. Croix Paper Co. as sulfite superintendent.

Two employees of the Forest Service in the U.S. Department of Agriculture who retired in December after a combined total of 78 years with the same agency are *HENRY WOLD*, head of financial administration and organization in the Division of Operation, and *WALTER H. SHAFFER*, head of the photographic laboratory, Division of Engineering. Mr. Wold joined the Forest Service in 1915 and Mr. Shaffer in 1911.

RECENTLY ELECTED AN HONORARY DIRECTOR of the National Fibre Can & Tube Association, James L. Coker (center), president of Sonoco Products Co., Hartsville, S.C., is presented with a bronze plaque in the form of a scroll at the semi-annual meeting of the association of Shawnee-on-Delaware, Pa. Shown with Mr. Coker are Ralph B. Busch (left), of Sefton Fibre Can Co., president of the association, and A. J. Bumgardt, also of Sefton Fibre Can Co.

Three group leaders have been appointed to the research and development department of the Olin Cellophane Division, Olin Industries, Inc. They are as follows: *DR. PRESTON M. KAMPMEYER*, cellophane research; *DR. WALTER S. KAGHAN*, process development, and *DR. GEORGE R. MITCHELL*, coating research. Dr. Kaghan was, at one time, a research engineer for St. Regis Paper Co.

THOMAS B. McCABE, president of Scott Paper Co., Chester, Pa., has been elected a director of the Union League of Philadelphia.

WILLIAM McKENZIE, formerly engineer at Gould Paper Co., Lyons Falls, N.Y., has accepted a position with Great Northern Paper Co., Millinocket, Me.

Two new trustees have been named to the board of American Forest Products Industries Inc. They are *ROBERT H. EVANS*, Frost Lumber Division, Olin Industries Inc., Shreveport, La., and *CLYDE MORGAN*, Rayonier Inc., New York City. *WILLIAM S. EDMUNDS*, of Lake Waccamaw, N.C., formerly executive director of the North Carolina Forestry Association, has been made head of the industry division.

Three promotions in the Paper Container Division of Continental Can, Co. have recently been announced. *JOHN JENNINGS* has been named assistant to the vice president; *J. H. TAYLOR* has been made manager of manufactur-

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mpc Wood-Lined Pipe's shock and vibration resistant qualities make it ideal for use in inter-plant distribution systems where maximum strength is essential.

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ing, and *GEORGE JOHNSTON* has been appointed manager of the Newark plant.

KARL R. BENDETSEN has been named general consultant with Champion Paper & Fibre Co. for the Texas division and will be stationed at the Houston Ship Channel plant.

C. E. KOHLHEPP, president of Wisconsin Public Service Corp., Milwaukee, Wis., has been made a member of the board of directors of Hoberg Paper Mills, Inc., Green Bay, Wis.

Elected to membership in the Controllers Institute are the following: *PHILIP A. BACHELDER*, comptroller, Coosa River Newsprint Co., Coosa Pines, Ala.; *WILLIAM A. BROWN*, controller, Orr Felt & Blanket Co., Piqua, Ohio, and *ROBERT W. HERR*, controller, Fox Paper Co., Cincinnati, Ohio.

WILLIAM J. ARGY, superintendent, St. Regis Paper Co., Harrisville, N.Y., has announced his resignation from the firm.

RONALD RICHARDSON, of Goldendale, Wash., has been appointed assistant managing director of American Forest Products Industries Inc. He has been with the organization since 1948 and has served as editorial director since 1950. He will continue to direct the editorial activities.

G. M. MINARD, plant manager at Kapuskasing, Ont., has been named vice president of Spruce Falls Power & Paper Co. Ltd. Mr. Minard joined the firm in 1928.

Two changes have been announced by Celanese Corp. of America. *DR. RALPH H. BALL*, who has been associated with the company for the last 21 years doing plastics research in Vancouver, B.C., has been made research executive with offices in New York. *HARMON HOWORTH*, manager of the Rock Hill, S.C., plant, has been promoted to a position in the New York main office. *ALEXANDER ROSE*, assistant plant manager at Rock Hill, succeeds him as plant manager.

CLYDE W. KING, manager of the public and industrial relations department of Fibreboard Products, Inc., has been elected president of the California Personnel Management Association.

Dobeckmun Co., Cleveland, Ohio, has announced the appointment of *ROBERT J. CHRIST* and *JOHN C. CAHILL* to the executive committee. Mr. Christ is vice president and manager of the West Coast division of Dobeckmun; Mr. Cahill is a member of the board of directors of BenMont Paper, Inc.

HAROLD C. PEARSON has been elected vice president of Dewey & Almy Chemical Co. of Canada Ltd., Montreal.

LAURENCE F. WHITTEMORE, president and chairman of the board of Brown Co., Berlin, N.H., became president of the New England Council recently. A director of the Council from 1930 to 1946, he has been New Hampshire chairman, secretary of the council, executive committee member, and active in many other special assignments.

L. F. Whittemore

J. G. Robinson

JOHN G. ROBINSON, vice president of Container Corp. of America, has been appointed vice chairman of the board of directors and chief executive officer of California Container Corp., a wholly owned subsidiary. He will retain his title in the parent company after transferring his headquarters to the San Francisco executive offices. *DONALD H. BREWER*, first vice president of O. B. Andrews Co., a Container Corp. of America subsidiary, has been appointed general manager of a newly created folding carton and boxboard division.

REED R. PORTER has been appointed executive secretary of the Association of Pulp Consumers, succeeding *KARL A. CLAUSON*.

Fairbanks, Morse & Co. recently announced that *R. H. MORSE III* has been appointed general manager of the company's Beloit, Wis., works. This marks the fourth generation of the Morse family to come to the management staff of the company. Mr. Morse succeeds *ORREN S. LESLIE*, who has been named manager of manufacturing at the company's headquarters in Chicago.

Dow Chemical Co. has announced the appointment of *RAYMOND F. BOYER*, former director of the company's physical research laboratory, as manager of plastics and high polymer research. He will be succeeded by *DR. WILLIAM C. BAUMAN*, assistant director of the laboratory since 1948, and will replace *L. C. CHAMBERLAIN*,

who has been named assistant to the director of research.

C. K. HOOD has been named a vice president of Worthington Corp. (formerly Worthington Pump & Machinery Corp.). He was previously manager of the New York district sales office. Succeeding Mr. Hood in New York is *W. J. VAN VLECK*, present manager at Atlanta. *C. W. KRAMER*, general line salesman at Birmingham, moves up to Atlanta. *I. W. LEGGETT*, general line salesman at Charlotte, N.C., has been made manager of the Charlotte branch office.

Appointment of *ROBERT E. BROOKS* of Teaneck, N.J., as a senior industrial sales representative in its New York, N.Y., office has been announced by A. E. Staley Mfg. Co., Decatur, Ill.

WERNER P. GULLANDER, Seattle district manager for General Electric Supply Corp. for the past three years, has been appointed financial vice president of Weyerhaeuser Timber Co.

JOHN S. KEIR, formerly executive vice president of Dennison Mfg. Co. of Framingham, Mass., has been elected president of the company to succeed the late Henry S. Dennison.

J. M. McNAMEE has been appointed sales representative for American Cyanamid Co.'s Industrial Chemicals Division in the Georgia and Florida district. He joined Cyanamid in 1950 at the Stamford Research Laboratories.

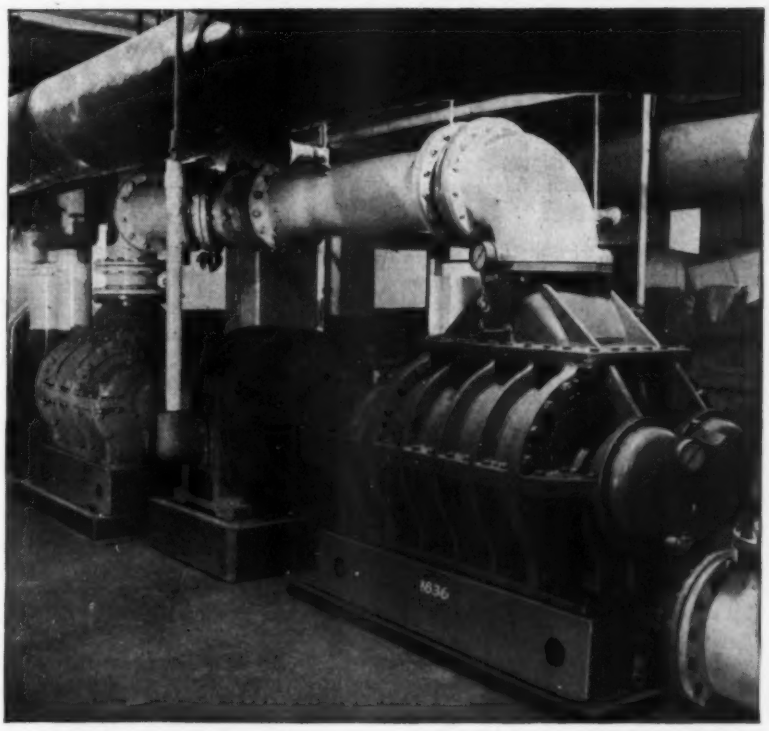
WILLARD P. CUNNINGHAM has been made director of engineering sales for L. O. Koven & Brother Inc., New York, N.Y.

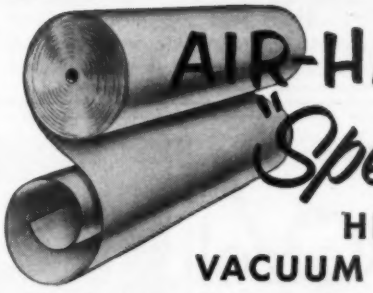
ARNO L. ZINKE has been elected president of Mid-States Gummed Paper Co., Chicago. He came with the company in 1940 as a sales representative and a short time later was made sales manager and then vice president. In 1951 he was made general manager.

WILTON G. SMITH has been appointed new district manager of the mid-central territory of Hyster Co. He recently had been manager of the company's Washington office.

JOHN L. CRAIG has been appointed sales representative in the Cincinnati office of the Michigan Alkali Division of Wyandotte Chemicals Corp.

HERBERT M. WENDLE has been named assistant director of sales for Hercules Powder Co.'s Naval Stores Department, in charge of rosin and terpene chemicals. For the past seven years he





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Lower first cost
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This long, specialized experience is at your command for solving vacuum pump problems, or for any other equipment needed to handle air—or gas.

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has been manager of the department's New York office.

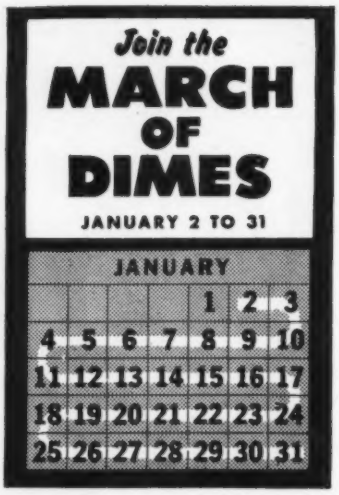
THOMAS R. EDWARDS, president of Niagara Corrugated Container Co., Buffalo, N.Y., has been appointed to the general corporations committee of the Greater University of Buffalo Development Program.

Lily-Tulip Cup Corp. has named *NORMAN LEBHAR* merchandising manager in charge of service products, *GEORGE AUSTIN* general sales manager, and *ED SOULLY* national accounts sales manager.

EDWARD W. SMITH III has been named assistant director of sales of transparent films in the plastic division of Celanese Corp. of America.

J. A. CRAGWALL, vice president and manager of the Kansas City Division of General Box Co., has been elected president of the firm. *N. W. EMBRY,* former president, was named chairman of the board.

Three new branch office industrial managers have been named for the Industrial Division of Minneapolis-Honeywell Regulator Co. *ROBERT M. WOODSIDE* was appointed branch industrial manager at Cleveland; *JOHN O. PAULL,* in Los Angeles, and *LEE APLIN,* in San Francisco. Each is a graduate of the company's Instrumentation School at Philadelphia.



Link-Belt Co., Chicago, announces that *GEORGE A. MOST JR.,* has been appointed district manager at Moline, Ill., to succeed *STUART T. PENICK.* Mr. Penick has been appointed sales engineer to specialize in power plant coal-handling equipment at the new Link-Belt Colmar, Pa., plant which was to begin operations in December.

JOHN P. RAMSEY has succeeded *HUGH L. COATS* as sales manager of Flexible Steel Lacing Co., Chicago. Mr. Coats continues his association with the firm as secretary and director.

JUDSON BEMIS of Bemis Bros. Bag Co. has been elected first vice president of Associated Industries of Minneapolis. Chosen second vice president was *ARNETT W. LESLIE* of John Leslie Paper Co.

National Gypsum Co. has elected *DOUGLAS B. LITTLEWOOD* to the position of secretary and *FRED A. WAGNER* to that of assistant treasurer and auditor. Mr. Littlewood formerly was assistant to the secretary, and Mr. Wagner served as controller at the government-owned National Gypsum-managed Kansas ordnance plant, Parsons, Kan.

FLOYD A. DEWEY, Chicago regional sales manager for hoisting equipment produced by Yale & Towne Mfg. Co., has retired after 33 years of service with the company. Previous to 1946, he had been district manager for Ohio, Michigan and Indiana.

The Paper Industry Necrology

James R. Shea

Resident manager of the Tyrone plant and a member of the board of directors of West Virginia Pulp & Paper Co., *James R. Shea,* 60, died November 25.

Mr. Shea began his long career with the paper company 45 years ago as a "roll boy" at the Tyrone plant, which was then known as Morrison & Cass Paper Co. In 1913 he was promoted to machine tender, a job he held until promoted to boss machine tender in 1920. In 1929 he became assistant superintendent of the plant's paper mill and was named superintendent of that department in 1934. Named acting manager in 1945, he became resident manager of the Tyrone mill the following year.

A prominent civic leader, Mr. Shea served as president of Tyrone borough council for almost 14 years and as a councilman for 22 years. He was president at the time of his death.

Arthur F. Sperling, 37, plant engineer at Downing Box Co., Milwaukee, Wis., for the last 11 years, died in a Milwaukee hospital December 22. He was one of the principal speakers at the Fall Corrugating Conference held by TAPPI in Milwaukee November 20 and 21.

Howard Crutchfield, 61, industrial engineer with Bathurst Power & Paper Co., Bathurst, N.B., died December 6. He also had served on the staff of Brompton Pulp & Paper Co.

Harry W. Butterworth Jr.

Harry W. Butterworth Jr., 62, chairman of the board of H. W. Butterworth & Sons Co., manufacturers of textile and paper finishing machinery and rayon spining machines, died December 17 at his home in Chestnut Hill, Philadelphia, Pa.

Mr. Butterworth devoted his entire business career to the Butterworth Co., serving as director for 32 years, secretary for 6 years, vice president for 9 years, and, finally, president from 1936 to 1952. He retired in March of this year and became chairman of the board.

H. W. Butterworth

G. E. Connolly

George E. Connolly, 55, vice president of Nichols Engineering & Research Corp., New York, N.Y., died suddenly at his home in New York City October 17. While his principal endeavors were in the metallurgical field, he was also active in the field of industrial waste disposal. The use of Nichols Herreshoff furnaces for the reclamation of foundry sand, the regeneration of bone char in sugar refining, lime calcining and the Nichols flash roasters for the production of SO_2 from pyrites, particularly in the paper manufacturing field, were of considerable interest to him; and he participated actively in the development of these fields.

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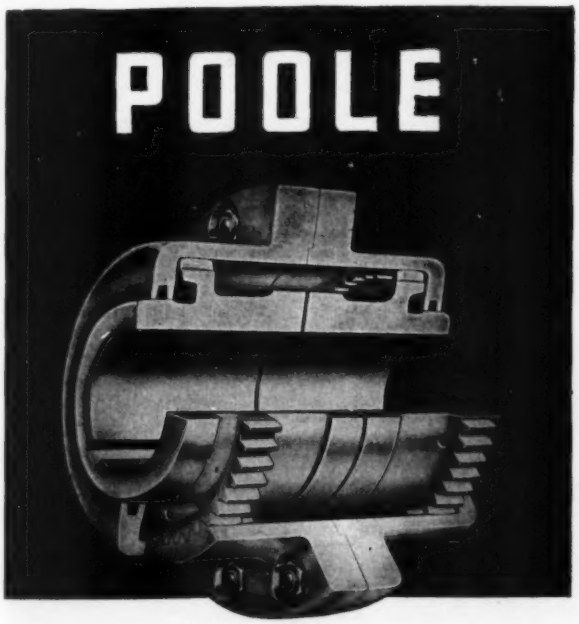

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Mill operators know the value of quality control in every step of paper-making . . . that's why you will find Oriskany Waterbury Felts in use in so many mills today. Every Oriskany Felt must pass rigid inspections in each manufacturing step from raw wool processing to finished felt . . . your assurance that it will meet your most exacting requirements on your equipment.

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Oriskany, New York

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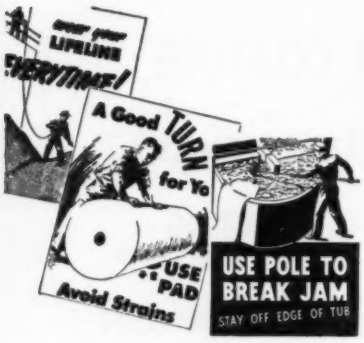


Posters should be one of the top aids in your safety program. No other safety medium can reach your entire audience—not once, but many times each day—with such low-cost safety messages. They are directed at the worker acts and worker attitudes that lead to accidents. Posters lend *timeliness, repetition and continuity* to your safety program . . . the three fundamental principles of direct selling.

The National Safety Council maintains a stock of posters that covers all industries, operations and phases of safety and health. These posters are produced in three sizes: "A" size, 8½" x 11½"; "B" size, 17x23"; and "C" size, 25x38". Their colorful illustrations and eye-catching captions make them ideal for the mass selling of safety.

Write for a free copy of the 1951 Directory of Occupational Safety Posters. This 72 page catalog illustrates 744 posters, indexed and classified for specific operations.

NATIONAL SAFETY COUNCIL
425 N. Michigan Ave.
Chicago 11, Illinois

The Paper Industry Safety News

Safety Contest at 10-month Point; Rate Below 1951

Compared with the identical period in 1951, the 10-month frequency rate in the 1952 Paper Industry Safety Contest is down 4 per cent. According to the National Safety Council, 60 contestants have maintained perfect scores.

The October frequency rate for all divisions was 8.67, while that for the first 10 months was 9.37. In the pulp and paper division the rate for the first 10 months was 9.11, down 5 per cent from the previous year. In the paper converting division the rate for the period was 10.14, down 2 per cent from 1951.

Of the 461 contestants entered, 193 recorded perfect scores in October. Of the 193, the three working the most man-hours were Champion Paper & Fibre Co., Canton, N.C.; Champion at Houston, and International Paper Co., Hudson River Mill No. 3. Firms with perfect scores through October were as follows:

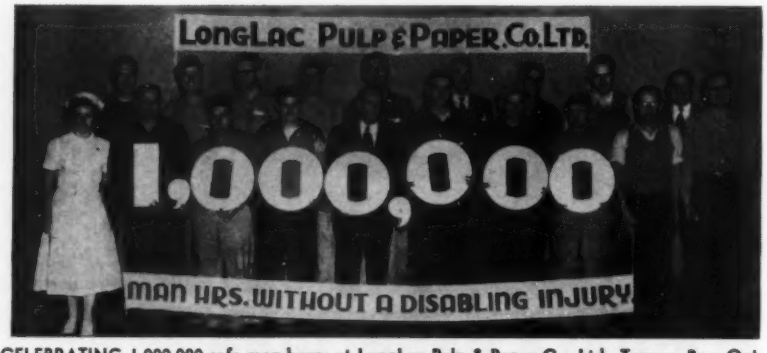
Division I—Pulp and Paper Mills

Group A
None

Group B
Price Bros. & Co. Ltd., Riverbend, Que.
Combined Locks Paper Co., Combined Locks, Wis.
Fraser Companies Ltd., Edmundston, N.B.

Group C
Marathon Corp., Menominee, Mich.
International Paper Co., Southern Kraft Div., Mobile, Ala.
Abitibi Power & Paper Co. Ltd., Fort William, Ont.

Group D
Certain-Teed Products Corp., York, Pa.
Masonite Co. of Canada Ltd., Gatineau, Que.
Central Fibre Products Co., Tama, Iowa
Marathon Corp., Ashland, Wis.
U.S. Gypsum Co., Oakmont, Pa.
Johns-Manville Corp., Asbestos, Que.
Strathmore Paper Co., Mill #1, Woronoco, Mass.
U.S. Gypsum Co., N. Kansas City, Mo.
Lloyd A. Fry Roofing Co., N. Kansas City, Mo.
Lloyd A. Fry Roofing Co., Memphis, Tenn.
Container Corp. of America, Chattanooga, Tenn.
National Gypsum Co., Pryor, Okla.
Lloyd A. Fry Roofing Co., Jacksonville, Fla.
Container Corp. of America, Wilmington, Del.
Volney Felt Mills Inc., Fulton, N.Y.
Riegel Paper Corp., Riegelsville, N.J.
Fort Wayne Corrugated Paper Co., Vincennes, Ind.
Johns-Manville Corp., Tilton, N.H.
American Writing Paper Corp., Mount Tom Div., Holyoke, Mass.
International Paper Co., Riley, Maine



CELEBRATING 1,000,000 safe man-hours at LongLac Pulp & Paper Co. Ltd., Terrace Bay, Ont., are the following members of the accident prevention committee (front row, l to r): Gertrude Bougie, nurse; Sam Chicoine; Gordon Conway; Frank Sechesky; D. C. Porter, mill manager; M. O. Nelson; R. R. Faust; R. H. Scowen; John F. Wade, and John L. Jeanneret; (back row), Leon Checkryn; Gordon Rowlandson; W. C. Borsum; Thor Olsen; R. G. Shirriff; H. C. Laundy; C. H. Knauff; Ken Hutchinson, and F. O. Soughton, services and safety supervisor; the safety record was achieved on December 8 as an average of more than 600 employees worked 225 consecutive days without a lost-time injury

Volney Felt Mills Inc., Mishawaka, Ind.
Amalgamated Roofing Co., Chicago
Spaulding Fibre Co., North Rochester, N.H.

Division II—Paper Converting

Paper Bags

St. Regis Paper Co., Los Angeles
St. Regis Paper Co. Ltd., Vancouver, B.C.
Pillsbury Mills Inc., Wellsburg, W.Va.
St. Regis Paper Co., Playa Ponce, Puerto Rico

Boxes and Cartons

Group A

Container Corp of America, Folding Div., Philadelphia (Manayunk), Pa.
Fibreboard Products Inc., South Gate, Cal.

Group B

Union Bag & Paper Corp., Savannah, Ga.
Container Corp. of America, Knoxville, Tenn.
Gaylord Container Corp., Dallas
Container Corp. of America, Greensboro, N.C.
Container Corp. of America, Baltimore
Gaylord Container Corp., Carton Plant
Green Bay Box Co., Corrugated Div., Green Bay, Wis.
Southwest Corrugated Box Co., Sand Springs, Okla.
Container Corp. of America, Philadelphia (Sixth St.), Pa.
Hankins Container Co., Chicago
Hankins Container Co., Elmira, N.Y.

Roofing Paper

Flintkote Co., Chicago Heights, Ill.
Lloyd A. Fry Roofing Co., Stroud, Okla.
Lloyd A. Fry Roofing Co., York, Pa.
Lloyd A. Fry Roofing Co., S. Kearny, N.J.
Lloyd A. Fry Roofing Co., Waltham, Mass.
Lloyd A. Fry Roofing Co., Robertson, Mo.

Insulation and Building Board

Abitibi Power & Paper Co. Ltd., Sturgeon Falls, Ont.

Specialties

Lily-Tulip Cup Corp., Augusta, Ga.
Lily-Tulip Cup Corp., Springfield, Mo.
Kimberly-Clark Corp., Appleton, Wis.
Scott Paper Co. (Cut-Rite), Sandusky, Ohio
Lily-Tulip Cup Corp., Galva, Ill.
Lily-Tulip Cup Corp., Brooklyn, N.Y.
Lily-Tulip Cup Corp., French Lick, Ind.

Gleason Resigns as Hammermill Safety Supervisor

Hammermill Paper Co., Erie, Pa., has announced the retirement of Walter A. Gleason as safety supervisor. Harry J. Hahn has been appointed his successor.

W. A. Gleason

Associated with Hammermill since 1916, Mr. Gleason became safety supervisor in 1920. He was a member of the original APPA safety committee, which in 1925 drafted a safety code for pulp and paper mills. In 1921-22 he was chairman of the Pulp and Paper Section of the NSC.

10
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One moving part. No valves, no pistons, no timing gears, no internal lubrication. This makes possible important operating advantages no other type pump offers.
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Foreign Abstracts.....

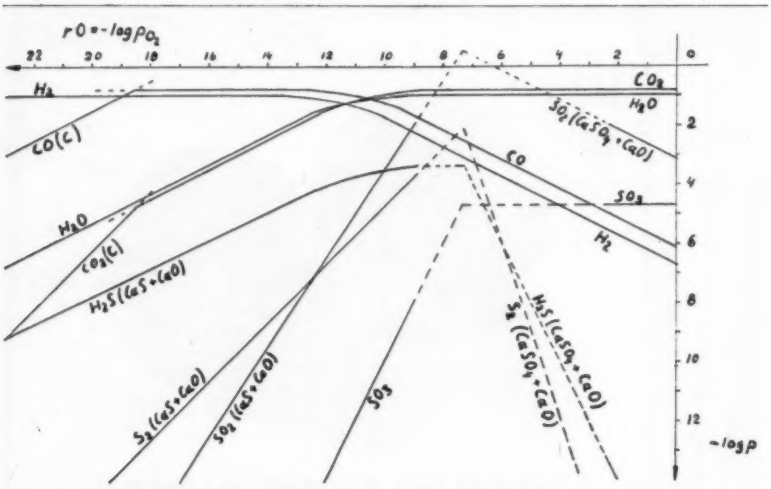


Fig. 1—Equilibria with Ca compounds at 1500° K: log p for each gas as a function of $rO = -\log p_{O_2}$. The broken lines are invalid because of sulfur shortage; in these parts of the diagrams the solid sulfur compounds have disappeared, and the only solid present is CaO

Solid-gas equilibria in burning sulfite spent liquors

The equilibria existing between gas and ash, when calcium or magnesium sulfite waste liquors are burned, are discussed in detail. Conditions are varied, and special emphasis is placed on the recovery of sulfur. Logarithmic graphs are given in which the equilibrium pressure of each gas is plotted as a function of the equilibrium pressure of oxygen.

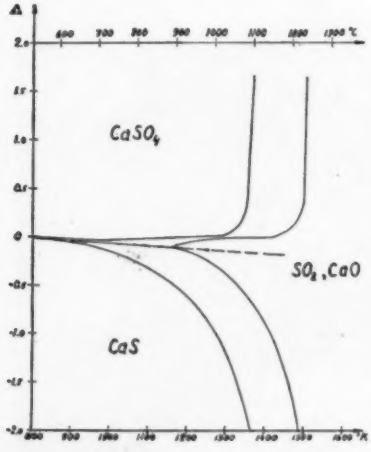


Fig. 2—(Δ, T) diagram for calcium; Δ, is roughly the oxygen excess or deficiency in per cent. In the areas so marked, and limited by full-drawn lines, the sulfur would at equilibrium be obtained chiefly as $CaSO_4$(s), as SO_2(g), or as CaS(s). In the intermediate area, appreciable amounts of sulfur would be present both as $CaSO_4$ and SO_2 (upper part), or both as CaS and SO_2 (lower part). In points on the broken line, $CaSO_4$ and CaS could be in equilibrium

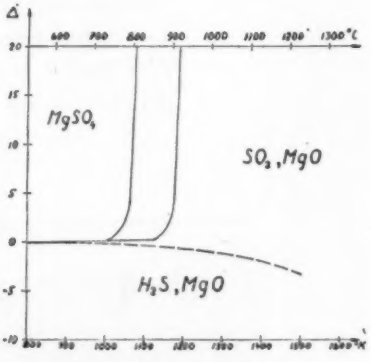


Fig. 3—(Δ, T) diagram for magnesium

It is convenient to introduce the symbol $rO = -\log p_{O_2}$. One of these rO diagrams is shown in Fig. 1. The diagrams are fully discussed and serve to give a good survey of the equilibria. Calcium base can be recovered readily as calcium sulfate (but this recovery is certainly not attractive). Sulfur can be recovered either as sulfur dioxide in the gas or as calcium sulfide in the ash, and suitable temperature ranges for such recoveries are shown in Fig. 2, together with Δ (the oxygen excess or deficit). The rate of attaining equilibrium and the rate of secondary reactions during the cooling of ash and gas are uncertain factors. With magnesium base, all sulfur can be obtained as sulfur dioxide or as hydrogen sulfide under a wide range of conditions; magnesium oxide (not magnesium sulfide) is obtained. This is shown in Fig. 3. "K" refers to the Kelvin temperature scale. Lars Gunnar Sillen and Torsten Andersson (Royal Inst. Technology, Stockholm). *Svensk Papperstidn.*, (Congress number) (Sept. 4, 1952). (In English).

Cellulosic raw materials from India

The authors have presented a series of articles dealing with indigenous raw materials of possible use in the production of pulp, paper and board, of which only two are abstracted here. Laboratory experiments on the preparation of chemical pulps at Dehra Dun (India) are described.

Helicteres isora Linn (I) (known as "Maror phal") is a large shrub which may attain tree size. It has thin spreading branches. The wood is a pale cream color and soft. The bark is used in cordage manufacture. (I) grows in many sections of India and Ceylon, in Java and Northern Australia, and (inasmuch as at present only the bark is utilized) the price of the wood should be low. Twigs from (I) gives a well-cooked kraft or soda pulp, provided the wood is crushed prior to chipping. The pulp lends itself to the manufacture either of writing or printing papers, but as the fibers are short, they should be mixed with about 40 per cent long fibered pulps (from either sabai grass or bamboo) to give papers showing adequate strength properties. Because of the shortage of rice or wheat straws for board, the authors suggest that other raw materials should be used so that Indian strawboard mills can be used to better advantage.

Laboratory cooks indicate that ulla grass *(Themeda arundinacea)* and panni grass *(Vetiveria zizanioides)* may be pulped by digestion with lime (10-15 per cent). The former requires crushing prior to digestion; the latter gives the higher pulp yield. In either case, good pulps are obtained. The laboratory tests still await the confirmation of mill runs, both for pulping and board manufacture. R. V. Bhat and M. M. Singh. *Indian Forester*, **77**, No. 11, 664-75 (1951); **78**, No. 1, 2-8 (1952); *Indian Pulp and Paper*, **6**, No. 12, 507-15 (1952).

Investigations on sheet formation

A review is given (in the first two sections) of literature on fiber properties, bonding, flocculation and orientation. Particular emphasis is placed on the methods used in analyzing strength properties and anisotropy of the paper sheet.

In the Department of Paper Technology of The Finnish Technological Institute, the author designed a sheet machine which duplicates the conditions under which a sheet is formed on a papermachine. This dynamic sheet mold (which is fully described) has a movable headbox that spreads the pulp suspension over a stationary wire to which a shake (with variable frequency and amplitude) can be applied. Thus, the resulting sheets have properties similar to those resulting from a commercial paper machine. The disproportionate influence of drying, however, is eliminated because the sheets are dried in the same way as are handmade sheets. From the strength of the resulting sheets, conclusions can be drawn regarding the method of sheet formation on the Fourdrinier wire.

The final part of this article deals with the mechanism of the wire "shake," and an attempt is made to gage the possibilities and the extent of decreasing the initial orientation (from slice and wire) by means

of the shake. Evidently, the opinions of different authorities vary greatly in this matter. The author's investigation is supplemented with slow-motion film exposures and shows that a fiber layer is gradually sucked onto the wire. Above this layer, the suspension represents a "wave motion" and, at the same time, is displaced with relation to the bottom layer. This results in the dispersion of the fiber flocks. The maintenance of the original fiber layer appears to be essential for an effective "shake." If, by chance, it is disturbed by an exaggerated motion of the shake, the sheet is completely destroyed. With increasing intensity of the shake, sheet formation improves, at first, quite rapidly, then more slowly, until a point is actually reached at which the formation of the lowest layer is wrecked. This point depends on the rate of removal of water. A high rate of water removal causes the bottom layer to become attached firmly to the wire so that the high "shake" intensity will not cause undue detrimental effects on the sheet. Hence, the wire shake is particularly valuable for high-speed machines and those with short wires.

The shake in the zone of entire water removal is important for decreasing fiber orientation. A shake which is constant throughout the whole process of water removal can greatly alter the ratio of tensile strength in the machine direction to that in the cross machine direction, *e.g.* from an initial 1.5 down to 0.9-1.1. The lower the fiber concentration, the lower is this ratio. When the shake does not provide water removal this tensile strength ratio can (in some cases) actually be increased. The applications of this work to papermachine conditions are discussed. Forty-seven references. Nils J. Lindberg. *Paper and Timber* (Finland), **34**, no. 6, 227-36; no. 7, 275-82; no. 8, 287-98 (1952). (In Swedish, with English summary.) (Through *Bull. Inst. Paper Chem.*, **23**, 110-11 [1952]).

Paper from flosses of *Cryptostegia Grandiflora*

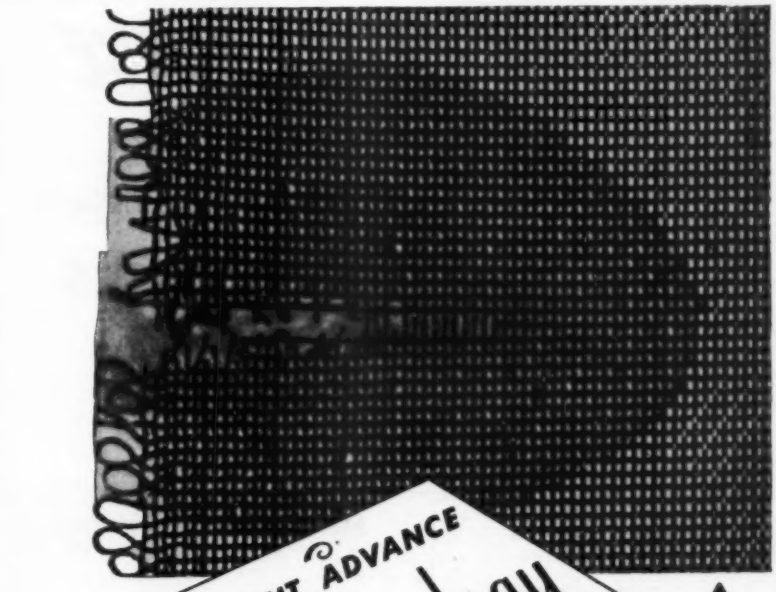
Papermaking experiments are reported with the seed flosses from the rubber creeper *(Cryptostegia Grandiflora)* which is indigenous to India and which grows wild as a hedge creeper. Some five thousand acres of land near Poona are covered by this plant, which up to the present has had largely a nuisance value. The flosses resemble cotton but have a silky appearance. They appear to contain more fats and waxes and do not wet as readily as cotton. When boiled 2 to 3 hours with 1 to 2 per cent soda solution, the floss gives a pulp which does not require the prolonged beating demanded by cotton, gives a better vegetable parchment, and yields material for kraft and tissues.

The author, working at the Paper Research Center of Poona, shows that the material can serve as a raw material for village or small-scale papermaking, giving better paper than do rice or wheat straw or those obtained from some of the wild grasses. A few laboratory data are given for conversion of the raw material (containing 35 to 40 per cent cellulose) into pulp. The bleached pulp yield is about 35 per cent. The author believes that small particles of rubber from the creeper are incorporated into the pulp and that these lend strength, toughness and smoothness to the finished sheet. The work is orientating in nature. N. K. Seshadri Iyengar. *Indian Pulp and Paper*, **7**, 81-82 (1952).

Groundwood manufacturing problems

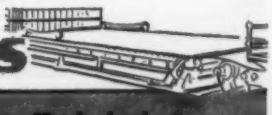
The outstanding problems in the manufacture of mechanical pulp are divided into two categories: (1) those dealing with the improvement of pulpstone and grinder design; and (2) those which deal with the operations in the grinding area and which probably consist of a series of interrelated mechanisms. The authors outline briefly advances in pulpstones, grinders, quality control, and the screening and thickening systems, and then discuss probable improvements in the groundwork process which could result from a series of studies, such as the influence of grit, stone burring, and the degree of softening of the pulpwood.

Reference is made to future investigations (in a miniature grinder and in a commercial unit) of the difference in the coefficient of grinding and the required induction period following sharpening before a suitable quality obtains. The hope is expressed that work along these (and similar) lines will provide additional information on the mechanism of the grinding



Magnified view of plastic edge reinforcement.

Lindsay research recognized and solved the need for the fast, lasting edge repair of Fourdrinier wires. This advance is saving countless hours of down-time in many paper mills. The Lindsay method is simple and inexpensive, paying for itself within a few days, as attested by operating experience. . . . The Lindsay Wire Weaving Company, Cleveland 10, Ohio.


Lindsay WIRES
FOR PAPER MILLS

process. J. Edwards and W. Boyd Campbell. *Pulp and Paper Mag. Canada*, **53**, No. 9, 88-90 (1952); cf. also Campbell, *Ibid* **52**, No. 3, 217-20 (Convention Number, 1951).

Flow box studies

In reporting various investigations connected with the flow box of the high-speed paper machine, a three-dimensional and a corresponding two-dimensional system for representing weight variation data are described. The author also gives an account of how it was possible to trace the cause of cyclical variations in weight. A simple method for determining the distribution, in the finished sheet, of fibers from one or more of the rotary screens is then described, together with a convenient technique for constructing narrow flow boxes and observing the flow through them. A model flow box of modern design is constructed from wood and a synthetic resin. The results are discussed. The article includes 5 tables and 20 figures. S. V. Sergeant. *Proc. Tech. Section British Paper and Board Makers Assoc.*, 33, No. **1**, 49-76 (with discussion pp. 77-80) (1952).

Treatment of waste liquors from a paper mill

A pilot plant treatment (with a percolating filter) of the entire effluent of a British mill is described. This mill produces specialties from hemp, cotton, linen and other textiles and utilizes a certain quantity of waste paper. The study entails the development of a biological method for obtaining an effluent of high quality.

The waste liquors consist of (1) spent soda black liquor, first washings in the digester room; (2) waste liquor from the later stages of washing and bleaching and, as the main wastes, (3) those from the final stages of washing, bleaching and beating, the white water from the paper machine, etc. From the results obtained it would appear that all the waste waters from this mill could be treated in percolating filters to give a suitable effluent, provided the pH of the mixed wastes were suitably adjusted, and the deficiencies in nitrogen and phosphorus were replaced by the addition of suitable inorganic compounds.

In treating a daily output of 13,000 gal. of (1), 55,000 gal. of (2) and 1,650,000 gal. of (3), it is estimated that percolating filters containing about 11,800 cu. yd. of medium would be required. If, however, (1) were not treated, only 4,900 cu. yd. of medium (with necessary sedimentation and humus-bed tanks) would be needed.

Irrespective of whether or not the black liquor (1) was treated, the cost of chemicals and nutrient salts would be considerable (especially that of ferric chloride used to give a flocculent precipitate) when aerated, dechlorinated water was pumped to the sedimentation tank. If pumping could be avoided at this stage, the amount of ferric chloride could be reduced and the cost of chemicals would be greatly lowered. Ten tables, 7 figures and 11 references. G. E. Eden, E. E. Jones, and A. B. Wheatland. *Paper Maker* (London), **123**, 4-10; 12-16 (Midsummer, 1952).

Control method for checking the oxidation of black liquors

The iodine consumption of a black liquor is determined (a) before and (b) after boiling with ammonium chloride. This causes the expulsion of hydrogen sulfide (H_2S) by the following equation:

$$Na_2S + 2NH_4Cl \longrightarrow 2NaCl + H_2S + 2NH_3$$

The difference, (a) minus (b) corresponds to the iodine consumed by sulfide sulfur.

The ratio b/a is termed the "oxidation ratio." Curves drawn up for each mill serve to relate this oxidation ratio to the degree of oxidation. This ratio gives the amount of sulfide *oxidized* as a percentage of the sulfide present in the *original* liquor, thus giving a measure of the efficiency of the oxidation installation. The relationship depends on the theoretical assumption that all of the sodium sulfide is oxidized to sodium thiosulfate in accordance with the equation:

$$2Na_2S + 2O_2 + H_2O \longrightarrow Na_2S_2O_3 + 2\,NaOH$$

If the iodine consumptions of the non-oxidized liquor are termed a_1 and b_1 and those for the oxidized liquors are termed a_2 and b_2 then the following relationship holds:

$$b_2 = b_1 + \frac{(a_1 - b_1) \text{ minus } (a_2 - b_2)}{4}$$

Results are given for data obtained from three mills. Five references. Nils Mannbro, *Svensk Papperstidn.*, **55**, 515-517 (1952). (Original in Swedish, with English and German summaries.)

COMPLETE SERVICE

Design
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Corrosion-Resistant
TILE TANKS
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Acid Storage Tanks

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Bleach Plant Tanks and Linings
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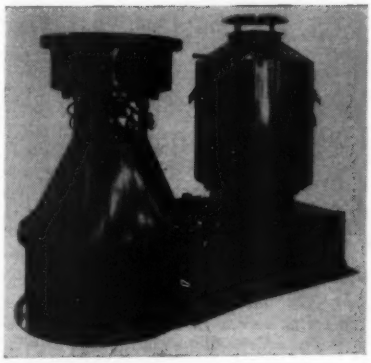
The Paper Industry New Products



Pulp discharger

A new piece of equipment, known as the Discharger, has recently been placed on the market. The function of this equipment is to continuously and uniformly discharge pulp at a constant rate from the Chemi-Pulper continuous digester to the atmosphere. It is now a component part of Chemi-Pulper continuous digesters, which are capable of producing pulps ranging from high yield semi-chemical pulp to bi-sulfite and kraft.

Mill operation has proved that the discharger uses only a fraction of a horsepower per ton of pulp. The horsepower usage is largely dependent upon the basic raw materials used and the cooking conditions.

The discharger is equipped with one or more continuous blow valves which are adjustable while the continuous digester is in operation. The amount of steam required to blow the stock through the discharge valve is very low. "V" belts from a vertical motor drive the discharger. Roller bearings are used throughout, and the unit has its own oil circulating system. The parts of the discharger which are under pressure are either solid or lined stainless steel. *Pandia Inc., 122 East 42nd St., New York 17, N.Y.*

Gloss recorder

A new dust compensated 75° gloss recorder consists of a photoelectric sensing unit which may be mounted over a moving web of paper and a sensitive electronic measuring unit that receives and records the photoelectric signals received for the sensing unit.

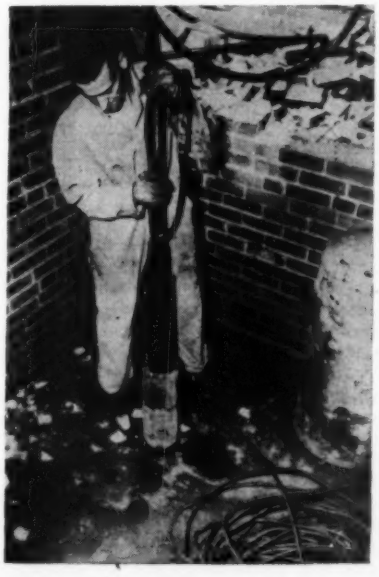
The instrument is designed to measure 75° specular gloss according to TAPPI method T480m-51, Specular Gloss of Paper at 75°. Some of the potential uses of the device are as follows: record the gloss of paper as it is polished on a supercalender stack; record the gloss of paper as it is coated or calendered on the dry end of a fourdrinier machine; record the gloss developed by a waxing, lacquering or other coating operation on paper, and provide a numerical gloss indication of any material flowing in a continuous web. *Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Md.*

Anchor bolt assemblies

Single and double anchor bolt assemblies, which have recently been developed, are guaranteed to give 50 per cent greater anchorage and can be easily installed wherever anchor bolts or expansion bolts are used.

Another feature of the assembly is that the anchor can be put in masonry, brick, wood, etc., at any angle, and the bolt can then be bent or off-set without disturbing the anchorage.

Single anchor bolts are designed for general anchorages, double anchor bolt assemblies for places where greater anchorage is required. Both can be obtained in bolt sizes from 3/16 in. to ½ in. and up to 5 in. long. A tamping tool is provided free with every 100 assemblies. *Super-Grip Anchor Bolt Co., 3333 North 22nd St., Philadelphia 40, Pa.*



Underwater pump

The new "Diver" underwater pump is most efficient for use when water levels are 75 ft. down or more. This noiseless, compact and streamlined pump is easy to install as it slips right down into the well, with tank and automatic controls at the surface. No priming is required. It is available in two sizes, ¾ h.p. and 1⅛ h.p. *Uniflow Manufacturing Co., Erie, Pa.*

Valve shield

A new flexible valve shield made of neoprene synthetic rubber has been introduced for use on valves handling acids and other hazardous chemicals. The shield protects the operator from injury if the valve stem packing should fail; it cups the stem and the packing gland and prevents acid from spraying on the operator or anyone working nearby.

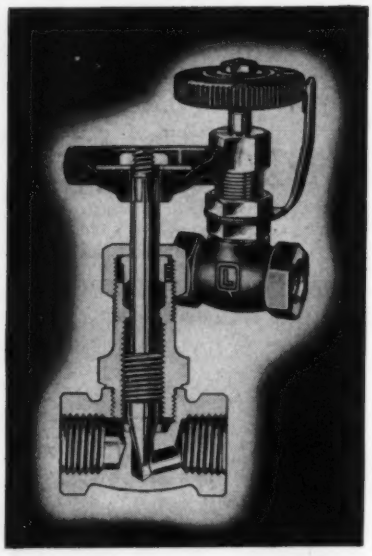
The shield, known as "Chex-Spray," is molded in the shape of a flower pot. It doesn't have to be wired in place and can be installed while the valve is in service. Where necessary, the edge of the skirt can be trimmed to suit the contour of the valve body.

An important advantage of the shield is its flexibility. It can be turned back to inspect the valve or to tighten the packing gland nuts. Longer life is another advantage. Neoprene is resistant to most acids, alkalis and hydrocarbons, and in outdoor applications it is much more resistant than natural rubber to deterioration by weathering and sunlight. They are currently being manufactured in three sizes, accommodating valve sizes from ¾ in. to 4 in. *Industrial Products Co., 2820 N. Fourth St., Philadelphia 33, Pa.*

Protective coating

Flexcoat maintenance coating provides protection against corrosion caused by acids and alkalis, can be brushed, sprayed or dipped, can be applied over old paints, has good adhesion to metal, wood or concrete, and has a wide range of colors to decorate and identify machines and pipelines.

This industrial coating contains no oxidizing oils, or resins. Drying entirely by solvent evaporation, no change takes place in the film as it ages to lower its inertness to corrosive products. Flexcoat is a complete system—primer and top coat are homogeneous. There is no possibility of intercoat separation. *Flexrock Co., Protective Coating Div., 3652 Filbert St., Philadelphia 4, Pa.*

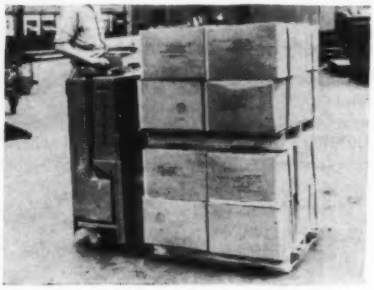


Needle valve

The newly developed gland-type bronze needle valve is small and compact, which makes it useful in pin-point control on small lines where fine regulation of flow is essential. It is manufactured in both globe and angle patterns. The handwheel is Lunkenheimer's new "non-slip" design, which lends itself to delicate finger-tip control.

This new control valve is also being produced in an indicator model in the globe and angle patterns. The handwheel on the indicator needle valve is of cast bronze and has numbered graduations indicated on its face, permitting resetting to a predetermined degree of opening. A spring clip engaging serrations on the outside of the wheel, holds the valve securely at its proper setting.

Both regular and indicator patterns are made with deep, well-packed stuffing boxes and employ hexagon gland followers. Bronze stems are made of Lunkenheimer "Stemalloy," a patented alloy particularly suited to needle valves where stems and discs are integral. *Lunkenheimer Co., Cincinnati 14, Ohio.*



Electric truck

A new addition to the Lewis-Shepard Master line of materials handling trucks is the Spacemaster Model "M" low lift truck, which is available in either platform or pallet types. This new riding-type electric truck raises 4,000-lb. loads off the floor.

One of the outstanding features is its ability ot work in minimum aisle space and cramped areas. The load is carried by the entirely separate load carrying frame and is supported at four points, including two stabilizing casters. The drive unit is hinged to the load carrying portion of the truck, thus the weight on the drive wheel is constant. Traction is uniform. *Lewis-Shepard Products, Inc., Dept. R-1, Watertown, Mass.*

Motorized sweeper

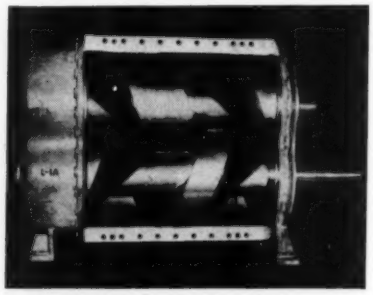
A new, improved motorized industrial sweeper, said to do the heaviest industrial sweeping jobs in a fraction of the time required by the old-fashioned push broom method, has recently been announced.

A powerful rotary brush sweeper and heavy-duty vaccum cleaner combined into an integral unit, the machine, it is claimed, will sweep dust, dirt, steel shavings, scrap paper and cardboard, grass, leaves, small metal parts and milling debris. Sweeping is done by eight sturdy 36-inch hardwood, Palmyra filled brushes welded into a single circular unit. *Multi-Clean Products, Inc., 2277 Ford Parkway, St. Paul 1, Minn.*

Electric pallet truck

Close-quarter operation, permitting greater utilization of factory and warehouse space, has been made possible by development of a riding-type electric powered pallet truck that can maneuver in aisles only six and one-half feet wide, with a 40 x 48-inch pallet.

The new materials handling unit, a pallet model "Transveyor" measuring 29 inches in length, plus load length, handles 4,000 lb., 48-inch long loads. It has four wheels, with three-point suspension, providing balanced action, which automatically equalizes the load on both front wheels regardless of floor conditions. Horizontal speed of the truck when loaded is about 4 miles an hour. *Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill.*



Compressor

A gas or air compressor called the "Spiraxial" compressor, entirely new in principle and design within its range, employs two intermeshing screw-rotors which rotate in opposite directions, instead of conventional rotors. These screws are operated by gears synchronized to prevent contact, allowing close but definite clearances between them. The "Spirotors" are formed along a spiral surface accurately generated to maintain correct clearances.

The flow of air or gas is axial, with most of the compression taking place at the back

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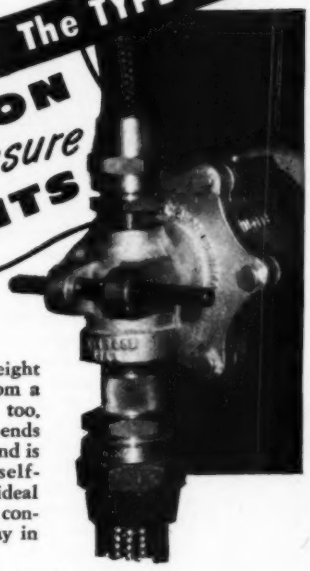

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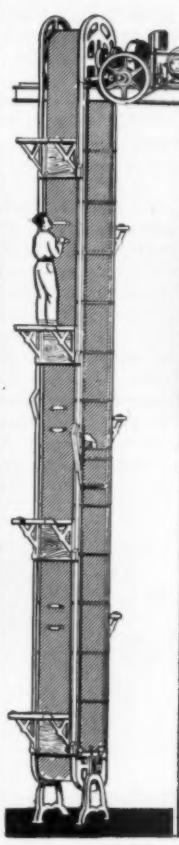

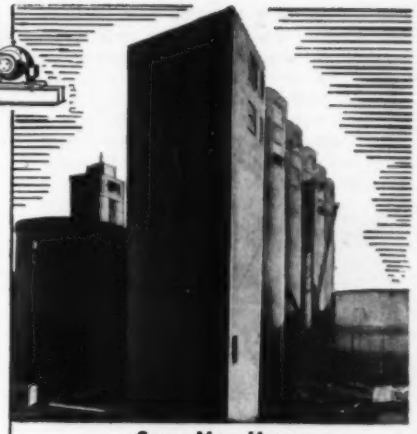

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of the casing. This allows an extremely large inlet opening, thus preventing strangulation of the inlet air and increasing the volumetric efficiency.

The manufacturer cites the following advantages over present types of equipment: peak efficiencies at discharge pressure determined by requirements; no internal lubrication used or needed; minimum of servicing, with wearing parts quickly accessible; low noise level, smooth operation; light weight. *Roots-Connersville Blower, Connersville, Ind.*

Steam cleaner

A new extra heavy-duty, high capacity steam cleaner, designated as BOE-600S, is capable of discharging up to 540 gal. per hour of pressure detergent spray and up to 540 gal. per hour of hot or cold pressure rinse simultaneously. It is designed to solve the cleaning problem in any operation requiring large scale cleaning on a mass production scale.

Equipped with a 60-gal. detergent concentrate tank and a 40-gal. fuel tank, the new steam cleaner will operate for 4 hours continuously at maximum load, and for many additional hours at lesser loads, without replenishment of the detergent or fuel supplies.

A detergent metering device maintains the detergent-water ratio at the level found most effective for rapid, thorough cleaning. Two hinged hoods provide quick access to working parts for minor adjustments. *Clayton Manufacturing Co., El Monte, Calif.*

Portable yard ramp

A new portable magnesium yard ramp has been designed to solve the materials handling problem of loading and unloading freight cars from the ground level because no dock facilities are available or existing facilities are congested.

Quarter round safety curbs with inner edges rounded to protect equipment are used along the top sides of the ramp. The ends of these curbs are capped with an end casting which tapers to each corner of the ramp. Bridge-type underbracing offers maximum strength with minimum weight. A large wheel on each side of the ramp balances the weight, permitting one man to easily push and roll the ramp to the desired position for use. The ramp in use is positioned in front of the freight car door and one end is raised by a hydraulic lifting mechanism.

The ramp may be obtained in five standard sizes, all of which are 30 ft. long but vary in widths of 60 and 70 in. Capacities range from 6,000 to 16,000 lb. *Magnesium Company of America, 1515 N. Kilpatrick Ave., Chicago 51, Ill.*

Balancing machine

The Model 652 Vibratron is a portable, rugged and simple to operate electronic machine for the analysis, evaluation, and correction of vibration. It will measure the amplitude and frequency of the vibration and, by means of a stroboscopic light, discover the source. It consists essentially of a vibration pickup, a multi-channel electronic circuit, and a stroboscopic lamp, and operates on 110v 60c current.

This machine is a maintenance and production as well as a research and inspection machine. An outstanding feature is its rugged and sensitive velocity-type vibration pickup which is said to withstand repeated drops on concrete floors and extreme rough treatment without failure or loss of accuracy. Pickup output is 82 millivolts at .001 in. deflection at 60 cps. *International Research & Development Corp., 908 W. Third Ave., Columbus 8, Ohio.*

Temperature regulators

Series "V", a new line of Farris Stacon self-operated temperature regulators, has recently been announced. Designed in either direct or reverse acting types for heating and cooling applications, these new temperature regulators can be employed to handle, through the valves, steam, liquids, gases and all fluids not corrosive to brass.

Series "V" regulators operate on the simple principle of liquid expansion. Since the liquid expansion is proportional to increments of temperature, the valve movement is gradual. The result is a gentle, but

positive, throttling where the valve supplies only enough steam or cooling medium to maintain the desired control temperature.

Available in sizes ranging from ¼ in. to 4 in., these regulators will control temperatures within a range of 25° F., with a 50° F. range of adjustment. *Farris Stacon Corp., 521 Commercial Ave., Palisades Park, N.J.*

Conveyor curve

A time-saving 90-deg. conveyor curve has recently been developed. No adjustments are required when direction is changed. Designed expressly for filling or emptying freight cars, the mobile Flop-Over conveyor curve provides flexibility and eliminates all setup time. This saves the time normally required to reverse and position conveyors for box car loading.

The Flop-Over curve consists of a half section pivoting on the center 45-deg. axis. The wheels or rollers on the half section extend above the channel on both sides enabling the half section to function when flipped in either direction. This permits the direction of flow of articles to be changed 180 deg. simply by changing the position of the conveyor from left to right as needed.

The curve when used in combination with the telescopic conveyor can be incorporated into any conveyor system. Both wheel and roller models are available. *Wilkie Co., 5520 Arch St., Philadelphia 39, Pa.*

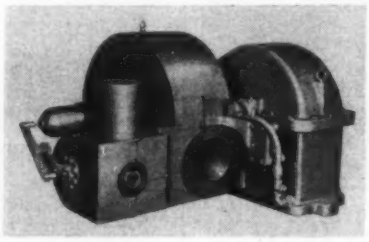
Dewatering screen

For processing fine materials, a new wedge-slot screen has been developed that is claimed to have at least double the open area of any other type of dewatering screen.

It is made with stainless steel bars, much smaller than ever previously used in a screen. These bars have a V-shape profile that is effective for dewatering, drying, filtering, heavy media recovery, wet screening and centrifuging. The bars are of two types: Type 10A for openings ranging from 0.004 in. to 0.04 in. and Type 15A for openings from 0.012 in. to 0.06 in.

Slot spacings are said to be uniform, even with an opening of 0.004 in. To prevent distortion of slot width in screening irregularly shaped material or from vibrating screen action, the spacing between rivets is only 1 in., instead of 2¾-in. spacing commonly used. An additional safeguard against mesh distortion during use is provided by special spacing lugs between the profile bars, which lock the mesh.

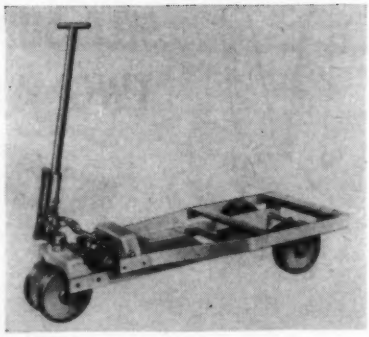
Both Type 10A and Type 15A can be provided with tension clasps for either side or end tension, interchangeable with any other tensioned screen type, for any make of vibrator. Installations can also be made without tension clasps for shakers, vibrators, and stationary equipment, by bolting, clamping between rubber strips, or clamping over bucker-up bars of vibrating equipment. *Hendrick Mfg. Co., Carbondale, Pa.*



Reduction gears

A new line of high-speed reduction gears for mechanical drive turbines are available in built-in or coupled designs. Built-in gears include Elliott turbine and gear case firmly secured together, with turbine wheels and pinion mounted on the same high-speed shaft. This eliminates exhaust-end bearing and coupling, permitting a compact unit of minimum over-all length. The coupled design is a self-contained gear unit which is flexibly coupled to a separate turbine drive.

Both designs feature precision hobbed double helical gears, liner-type sleeve bearings, special Kingsbury-type shaft seals, and self-contained forced feed lubrication system. They are offered in gear ratios up to 5:1 for built-in units and up to 8.5:1 for the coupled design. *Elliott Co., Jeannette, Pa.*



Lift truck

A new multistroke hydromatic lift truck is now on the market. Seven outstanding features of this new lift truck are: easy lift; extra high lifting ratio (88 to 1); new type exclusively designed hydraulic ram; all parts machine fitted with bolted construction; box frame construction to give greatest strength, low bearing pressures, and eliminate the need for continual adjustment; easy rolling, ball bearing wheels on Models with 5000-lb. capacity and over—roller bearings on models with 3500-lb. capacity; malleable alloy castings used throughout on all models. *Lift Trucks Inc., 2423-2435 Spring Grove Ave., Cincinnati, 14, Ohio.*

Liquid level control

Liquid level control Type 10CB1 makes available a completely maintenance-free level control. With the unique principle of Photoswitch design, contact with the liquid is made only through stainless steel probe rods. No floats, bellows, or other moving parts are required in the tank.

Type 10CB1 is recommended for level control of all electrically conductive liquids. Selection from four sensitivity ranges to match the probe circuit to the electrical resistivity of the liquid being controlled is possible. An ample margin of sensitivity is provided without the possibility of excessive sensitivity and, as a result, the control will discriminate between a liquid and its foam. In addition, when the probe circuit sensitivity has been properly selected, the control is not affected by the saturated vapor above the liquid in a closed tank, permitting positive control of acid in batch processing.

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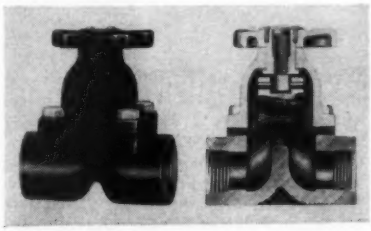
with either NEMA 3 weather-resistant housing or NEMA 4 watertight housing. Probe fittings are available to meet the requirements of all types of installations. The control consists of an electrical relay operating from a probe circuit through a transformer and a rectifier. *Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.*



Diaphragm valves

Combining the unique corrosion resistance of Ace Paritan with the Saunders diaphragm principle, these new general-purpose diaphragm valves are said to be well suited for the handling of a wide variety of corrosive chemicals.

Metal never comes in contact with the liquids handled. The valve body is molded of Ace Parian, plastic compound in the polyethylene family. The diaphragm may be rubber, neoprene, or polyethylene, as required. The bonnet assembly is sealed off from the solution, and the valve has no stuffing box to leak. It can be serviced without removing from the line, and all parts are interchangeable.

The valves are available in all standard sizes from ½ to 2 in., threaded for standard pipe threads. Working pressure is 50 lb. psi at 77 F. These diaphragm valves are also available with bodies molded of Ace Saran. *American Hard Rubber Co., 93 Worth St., New York 13, N.Y.*

New Products Briefs . . . .

WALL PAINT—A new latex base wall paint which may be painted directly over damp surfaces is called Arcotone Vel-Lure. An aid to paper mills and other industries where humidity is a problem, this paint dries in 20 minutes and leaves no paint odor. It is also claimed to have extra film toughness, washability and ability to shed dirt, dust and grime. *Arco Co., 7301 Bessemer Ave., Cleveland 27, Ohio.*

ADJUSTABLE BASE FORKS — Introduced as optional equipment for Raymond's line of straddle-type electric tiering trucks, the new adjustable base forks permit these trucks to handle pallets varying in width from 32 in. to 48 in. Made of rugged welded steel sections, the forks are hinged to the main frame and adjusted manually by a screw arrangement. *Raymond Corp., 8099 Madison St., Greene, N.Y.*

ANCHORING ASSEMBLIES—A new pipe bolt anchoring assembly and a new eye bolt anchoring assembly both provide 50 per cent greater anchorage. The pipe bolt assembly is used for mounting conduit, gas, water pipe, etc., to masonry, while the eye bolt assembly is used for anchoring guy wires to masonry. Both assemblies are rustproof. *Super-Grip Anchor Bolt Co., Inc., 3333 North 22nd St., Philadelphia 40, Pa.*

WATER REPELLENT—Silicote, a silicon-type water repellent for use on exterior and interior masonry surfaces, is not affected by any oxidation process. The silicon assures deeper penetration into the masonry surfaces to act as a water repellent, and it will also prevent staining and efflorescence. *Wilbur & Williams Co., 130 Lincoln St., Boston 35, Mass.*

GASKETS—Teflon is now being used successfully in the spiral-wound gasket construction, for process applications where extreme inertness to chemicals is important. The gasket construction consists of alternating plies of Teflon and stainless steel. Chief advantage of this gasket is said to be the elimination of cold-flow normally encountered in a Teflon seal. *Flexitallic Gasket Co., Camden 2, N. J.*

LATEX-BASE PAINT—"Arcotone Vel-Lure" a new latex-base wall paint, is easy flowing, permits high-speed production, and shows uniform, lap-free texture when dry. Other features of this paint are: twenty-minute drying, absence of paint odor, extra film toughness, washability, adhesion and ability to shed dust, dirt and grime, impervious to moisture. No primer is needed except where previous coatings are calcimine or other water-soluble paints. *Arco Co., 7301 Bessemer Ave., Cleveland 27, Ohio.*

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Books

WOOD CHEMISTRY, Second Edition, Vol. I and II. American Chemical Society Monograph No. 97. Edited by Louis Elsberg Wise and Edwin C. Jahn. Published by Reinhold Publishing Corp., 330 West 42nd St., New York 36, N. Y. 1600 pages. $15.00 per volume.

This is the latest, just off the press, publication describing fully the basic chemistry underlying the important processes and products based on wood or wood cellulose. Its 34 chapters are either entirely new or rewritten in the light of new and more comprehensive knowledge. The new chapters thoroughly cover such special topics as growth, anatomy and physical properties of wood, phenolic and related extraneous constituents of heartwood and their relation to taxonomy, the chemistry of extractives, biological decomposition of cellulose, and the chemical analysis of wood and its components.

Volume I, containing chapters 1 to 17, covers the growth, anatomy, and physical properties of wood; components and chemistry of the cell wall, and the extraneous substances.

Volume II, including chapters 18 to 34, deals with surface properties of cellulose materials; industrial wood chemistry; decomposition of wood by microorganisms, and the chemical analysis of wood.

Contributors to this authoritative monograph are F. E. Brauns, Harry P. Brown, B. L. Browning, M. A. Buchanan, W. S. Campbell, Holger Erdtman, Carl C. Forsaith, A. W. Goos, William M. Harlow, E. E. Harris, George C. Harris, L. F. Hawley, W. F. Holzer, I. H. Isenberg, Edwin C. Jahn, Ervin F. Kurth, H. Mark, Clifford B. Purves, Alfred J. Stamm, C. J. West, Louis E. Wise, and F. H. Yorston.

This monograph needs no apology. When the above mentioned authorities combine forces to compile and edit a monograph on wood chemistry, the result is bound to be a must for every progressive pulp and paper plant, wood products research laboratory and rayon mill.

THE DEVELOPMENT OF EXECUTIVE TALENT. Edited by M. Joseph Dooher and Vivienne Marquis. Published by American Management Association, 330 West 42nd St., New York 36, N. Y. 576 pages. $6.75 to non-members; $5.75 to members.

A company guide to executive training and management development, this manual is designed to meet the needs of any company contemplating the introduction of a program of executive development for the first time or desiring to improve its present program.

The main body of the book is divided into nine parts, consisting of 50 chapters, including an appendix and bibliography. Subjects covered include: setting up the program—basic principles and practices; organization planning; putting the program into action; special approaches, techniques and programs; getting results from follow-up counseling; program evaluation; trends in management development; and case studies of representative companies.

This handbook contains specific, practical guidance on all the problems involved at every stage of planning and administration—from the analysis of needs, through the discovery of latent executive ability, to the inventorying, rating and development of executive skills. Fourty-four authors contributed to the compilation.

BEST'S SAFETY AND MAINTENANCE DIRECTORY, 1952-1953. Fourth Edition. Published by Alfred M. Best Co., Inc., 75 Fulton St., New York 38, N. Y. 8½ x 11. $5.00.

This informative guide lists, evaluates and describes every type of safety and maintenance product and equipment and the specific hazards they are designed to overcome. This new edition has been revised, enlarged and improved, and contains new streamlined editorial arrangements and indexing.

Included in the directory are sections on: radiation protection, plant maintenance and sanitation, production equipment, above ground protection, atmosphere analysis equipment, fire protection, liquid and solid materials handling, machinery guarding and control, personal hygiene and sanitation, personal protection equipment, plant lighting and electrical equipment, roofing equipment, training and warning aids, and miscellaneous equipment.

Booklets and Pamphlets

THE CONSULTING CHEMIST AND CHEMICAL ENGINEER IN A WORLD ECONOMY. Published by Association of Consulting Chemists & Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y. 8½ x 11. 32 pages. $1.00. This booklet is divided into five chapters explaining why a consultant should be engaged, what he does, his advantages to a client, etc. Chapter 5 presents case histories of many different industries. The book concludes with a summary, epilogue and the association's code of ethics.

TECHNICAL NOTES NOS. 366 TO 375. Published by Lake States Forest Experiment Station, U. S. Department of Agriculture, Forest Service, University Farm, St. Paul 1, Minn. 8 x 10½. Topics covered in these one and two-page papers are as follows: Thinning Young Oak Stands for Fuel; Some Costs and Effects of Chemical Release of Pine in Northern Michigan; Is the Growth of Jack Pine Reproduction Affected by Age of Parent Tree?; More Ungrazed Farm Wood Lots in Minnesota; 1951 Seed Crops Poor to Fair in the Lake States; Second-Growth Woodland Can be a Financial Asset to the Farm; Disking to Regenerate Pulpwood Species; Seed Production of a White Spruce Tree; Labor Costs for Thinning Young Aspen; A Mill-Scale Log Rule.

SUBJECT INDEX TO BIBLIOGRAPHY OF TECHNICAL REPORTS, VOL. 9. Published by Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. The index covers the period April 2 to June 25, 1948. Indexes to Volumes 6, 7, 11, 12, 13, 14 and 15 are available at the same price.

TECHNICAL NOTES NOS. 376 TO 380. Published by Lake States Forest Experiment Station, U. S. Department of Agriculture, Forest Service, University Farm, St. Paul 1, Minn. 8 x 10½. Topics covered in these one-page papers are as follows: The Jack-Pine Budworm—A Menace to Michigan Jack Pine; Understory Balsam Fir Responds Well to Release; Less Oak Reproduction on Better Sites; Reproduction After Cutting in Hardwood-Hemlock Stands; Mortality Following Heavy Partial Cutting in a Hardwood-Hemlock Forest.

ANNUAL REPORT 1951, NATIONAL BUREAU OF STANDARDS (NBS Miscellaneous Publication No. 204). Published by National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C. 105 pages. 50 cents. (Order from Government Printing Office, Washington 25, D. C.) Summarizing scientific and engineering investigations conducted by NBS during the fiscal year 1951, this booklet contains accounts of current activities, as well as more detailed descriptions of especially important developments. Its text provides a general description of work done in the 15 scientific and technical divisions and gives many specific examples of significant projects at NBS during the year.

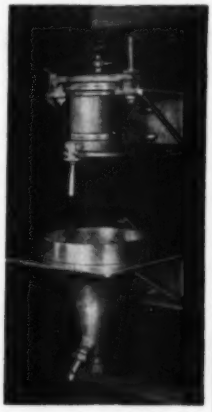
Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.

Power Transmission Equipment. Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio—This 4-page bulletin, No. A-2703, describes and illustrates Reliance's principal products, including motors, drives, electronic controls and regulators, motor-generator sets, generators, and

CANADIAN STANDARD FREENESS TESTER

for accurate beating control



Tappi Standard T 227 M-50

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TESTING MACHINES, INC.

manufacturers and distributors of the finest test equipment for the paper, textiles, plastics, metals industries and laboratories.

123 WEST 64TH STREET · NEW YORK 23, N.Y.

worth its weight in greenbacks

Equip your dryers, particularly the wet end section, with Midwest Ball Sight Flow Indicators and keep tab of your condensate flow.

Window will not—cannot—cloud and obstruct the view.

Install in discharge line whether vertical or horizontal.

Fitting bronze and non-corroding. Glass ball of heavy Pyrex and replaceable. Unit effective up to 75# pressure. Standard pipe sizes ½" to ¾", 1¼" and 1½". With or without non-corroding temperature indicator.

Thousands in service—and you need them too. Order several Midwest Ball Sight Flow Indicators for trial. If not worth their weight in greenbacks, send them back.

Drop us a line for folder and price list.

Midwest Ball Sight Flow Indicator glasses positively do not cloud up and obstruct the view—glass always clear.

MIDWEST · FULTON MACHINE COMPANY
DAYTON, OHIO

In this case,
4 IS THE LUCKY NUMBER

4 Plants Served by 4 Different Railroad Systems

Assure an Unfailing Supply of

DICALITE

These two foursomes are your best guarantee that you'll *always* be able to get the DICALITE you want, when you need it, in the type and quantity you order. With plants spread from Oregon to Southern California, with four different railroad systems to supply you, no local occurrence can shut off the DICALITE supply. If fire, flood, storm, power failure or mechanical troubles beset one locality, the other three can, and will, supply you —an important point, considering the recent difficult supply situation.

Further insurance that you'll get quick, dependable delivery is our increased production capacity —today 75% greater than it was a year ago. Whether you need filteraids, fillers, insulation or other diatomaceous materials, DICALITE provides products that meet high performance and quality standards . . . and provides them in full supply.

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Dependable GREAT LAKES *Dicalite* DIATOMACEOUS MATERIALS

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION
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Professional and Business Services

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J. E. SIRRINE COMPANY
GREENVILLE SOUTH CAROLINA

rotating-type regulators. Many functions and advantages of each product are included, service applications for which they are designed are indicated, and representative units illustrated.

Water Conditioning. Uniflow Manufacturing Co., Erie, Pa.—This 4-page folder describes industrial water conditioning equipment. General specifications and a capacity table are included.

Chimneys. Rust Engineering Co., Chimney Div., Rust Bldg., Pittsburgh 19, Pa.—Nearly a half-century of Rust's chimney building service to industry is described in this 4-page folder. Some of these chimneys are shown in the 23 illustrations of the folder, which also depicts one of the country's tallest chimneys in various stages of construction.

Sheet Feeding Tables. Raymond Corp., 8094 Madison St., Greene, N. Y.—2000-lb. model hydraulic sheet feeding tables are illustrated and described in 2-page Bulletin No. 262. Full specifications and application photographs are included.

Tachometer Heads. Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.—Technical Data Sheet No. 56M describes Series 56M rugged heavy-duty speed measuring heads for rotational or linear speed measuring installations requiring ruggedness and where the head shaft can be rotated between 100 and 10,000 rpm for full scale reading.

Pressure Controller. Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Station 40, Wayne & Windrim Aves., Philadelphia 44, Pa.—A new non-indicating pressure controller, known as the Honeywell Pressure Pilot, is fully described in Bulletin 16-1. The 8-page catalogue covers the principle of operation, specifications, design features, mounting dimensions, and other pertinent information.

Paper Testing. W. & L. E. Gurley, Troy, N. Y.—Methods of testing paper, paperboard, textiles, plastics and other sheet materials, as well as the complete line of Gurley instruments for performing the tests are described in the 20-page bulletin (No. 1400). A new feature of the bulletin is a table of air resistance equivalents, which helps the technician select the type of instrument best adapted to various materials.

Spectrophotometers. Beckman Instruments, Inc., South Pasadena, Calif.—Bulletin 73-222 is a new bibliography of applications for the Beckman models B and DU spectrophotometers. More than 500 specific sources of application data for these instruments are listed. The first section is devoted to identification, analysis and color measurement. Special sections provide up-to-the-minute data on structural identification, rate and equilibria studies, emission (including flame spectrophotometry), special instrumentation and standards, calibration, filters, theory and miscellaneous references.

Conveyor Belt Lacing. Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill.—Two-page bulletin No. A-70, describing and listing Alligator long length conveyor belt lacing, contains application views, sizes and list prices, as well as other pertinent information.

Elevating Table Accessories. Raymond Corp., Greene, N.Y.—Many optional accessories for use with hydraulic elevating tables are described in 2-page Supplementary Bulletin No. 233. Shown are towing handles, retaining bars, two-speed foot pump, roller top, die separators and several other accessories.

Log-Carriage Drives. General Electric Co., Schenectady 5, N.Y.—This 8-page article reprint, designated as GER-594, describes amplidyne-controlled electric log-carriage drives. The article originally appeared in an internal G-E publication and was written by W. L. Lagers, of the company's Industrial Engineering Dept., and W. D. Vincent, application engineer in the Seattle office.

Gages and Valves. Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.—This 4-page bulletin (Unit No. 180) gives general information and features of standard gage types, process gages, typical Jerguson gage valves, optional features and accessories, special application gages, steam gages for all pressures, and the mercury vapor illuminator for steam gages.

Alloy Castings. International Nickel Co., Inc., 67 Wall St., New York 5, N.Y.—This 48-page booklet about heat resistant and corrosion resistant alloy castings in industry discusses typical compositions regularly produced, with their applications, limitations, and the types of service for which they are suitable. Over 175 photographs illustrate applications of typical alloys by industry. Charts compare creep strength of various alloys, resistance to corrosion in certain media, and to oxidation at elevated temperatures. Tables of composition list principal Alloy Casting Institute designations, as well as certain proprietary alloys.

Ball and Roller Bearings. Gwilliam Co., 360 Furman St., Brooklyn 2, N.Y.—16-page Catalogue No. 28 describes the Gwilliam line of ball thrust bearings, roller thrust bearings, step bearings, journal roller bearings, industrial roller bearings, and special bearings. The various types are well illustrated and standard sizes listed in tabulated form.

Insulation. Baldwin-Hill Co., 1134 Breunig Ave., Trenton, N.J.—Industrial insulations is the subject of this new 20-page catalogue. Insulating materials which cover the complete temperature range from 150 F. to 1800 F. are described. Insulating cement, block, blanket, felt, and pipe covering are a few of the products shown in the catalogue. Brief application descriptions together with typical uses, sizes, packaging, and densities are given. Thermal-conductivity graphs and heat loss charts are included. The catalogue also shows list prices subject to trade discounts.

Dust Filter. W. W. Sly Manufacturing Co., 4700 Train Ave., Cleveland 2, Ohio—This 8-page bulletin, No. 102, gives complete engineering data on the new Sly Dynacione dust filter, including details of construction, principle and application. Hints on the engineering of dust control problems, as well as other useful engineering aids, are included.

Miniature Indicators. Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne and Windrim Aves., Philadelphia 44, Pa.—4-page Specification Sheet 770 describes the operation of the Tel-O-Set miniature indicating pneumatic receiver that provides manual loading and remote index setting. The sheet includes illustrations of the approximately 5 x 5 in. instrument and shows how it is employed in a typical control system.

Purity Meter. Barnstead Still & Sterilizer Co., 224 Lanesville Terrace, Forest Hills, Boston 31, Mass.—The new folder, No. 125, describes the Barnstead purity meter, an electronic testing device for determining the purity of either distilled or demineralized water. A section of the folder is devoted to the conductivity diverter, an automatic control device. Other accessories are also described.

Floor Machines. Hild Floor Machine Co., 740 West Washington Blvd., Chicago 6, Ill.—Specifications for six different floor machine models are given in a new 4-page circular. The operation of the shower-feed brush is explained. The adjustable handle and safety switch are described. Photographs show how nine kinds of maintenance work may be done on floors of all kinds using machines with interchangeable attachments.

Boilers. Orr & Sembower, Inc., Morgantown Rd., Reading, Pa.—Bulletin 1218 contains complete descriptions with dimensions and data on several types of Powermaster packaged automatic boilers in 16 different sizes.

Acoustic Panels. Industrial Acoustics Co., Inc., 333 Jackson Ave., New York 54, N. Y.—A booklet on the new IAC standardized acoustic panels describes how these panels can be used to silence noise in hundreds of applications ranging from power plant transformers to all phases of machinery.

Bronze Welding Rod. Eutectic Welding Alloys Corp., 172nd St. & Northern Blvd., Flushing, New York 58, N. Y.—A new leaflet, TIS 997-P, describing EutecRod 148FC, a new bronze welding rod with a special flux coating, contains complete specifications and technical data.

Crown Couplings. De Laval Steam Turbine Co., Trenton 2, N. J.—Crown couplings are described in the new 4-page Bulletin 2200, which presents complete data. Information on construction, horsepower ratings, speeds, applications and selection is presented.

Elevating Tables. Raymond Corp., 8093 Madison St., Greene, N. Y.—Revised Bulletin No. 232 describes standard hydraulic elevating tables. Features of the product are outlined and actual on-the-job illustrations are given. Full specifications are presented.

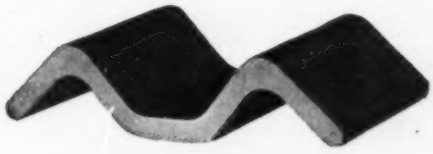
Surface Coatings & Impregnation. Acheson Colloids Co., Div. of Acheson Industries, Inc., Port Huron, Mich.—"Colloidal Graphite for Surface Coatings and Impregnation" is the title of 6-page Bulletin No. 435. The section on impregnation describes methods of impregnation and applications, including paper.

Conveyors. Rapids-Standard Co., Inc., Dept. GC, Rapistan Bldg., Grand Rapids 2, Mich.—A newly-revised 28-page catalogue, designated as GC-52, features Rapistan conveying equipment, with photographs, drawings, and specifications of an enlarged line of power and gravity conveyors, hand trucks, and industrial casters. Several new equipment models recently announced by the company are shown for the first time in the catalogue.

Cleaning Compound. Detrex Corp., Detroit 32, Mich.—A leaflet describing Detrex 79, a compound used for cleaning and imparting a fine-grained phosphate coating to steel parts to provide a good paint bond, is now available.

Stock Preparation Equipment. E. D. Jones & Sons Co., Pittsfield, Mass.—Bulletin EDJ-1035, containing 6 pages, gives general characteristics, design features, working drawings and photographs of the Jones Fibremaster, Master Jordan and Midget Jordan.

Bark Hard or Soft Woods up to 8′ in Length Wet . . . Dry . . . or Combined Dry and Wet With F.M.P. Welded M-Bar Barking Drums



M-Bar—Hot Rolled

Exclusively used in F.M.P. drums. Welded and riveted to heavy ship channels.

119—barking drum sales since 1947—(99—12′ D. x 45′ L.; 11-12′ D. x 67½′ L.; 9 misc.)

Barking drums can be furnished with long or short column steel frames to fit customer's requirements. Drumshells shipped completely shop-assembled.

Built-up drumshells and steel frames fabricated at Birmingham, Chicago, and Greenville, Pa.

FIBRE MAKING PROCESSES, INC.

Manufacturers of Barking Drums since 1915, welded drumshells since 1933

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CONFIDENTIAL EMPLOYMENT SERVICE
for paper mills, pulp mills and paper converting plants; serving employers seeking executives and executives seeking positions.
CHARLES P. RAYMOND SERVICE, Inc.
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WANTED—Mechanical engineers for staff and sales. Opportunities for interesting, well-paid career with growing firm in heavy industrial machinery field. Ambitious men in their thirties are asked to supply background details. Reply to Box 547, The Paper Industry.

WANTED—Recent papermaking or chemical engineering graduate; some technical experience in paper or paperboard desirable. Man selected will be responsible for product and process development work as a member of the technical staff in a progressive integrated midwestern board mill. Excellent advancement opportunities exist. In replying, give complete background of education and experience along with salary requirements. Address: Box 548, The Paper Industry.

SULPHITE MILL ACID PLANTS

Sulphur Burning Plants • Jenssen Two Tower Acid Systems • Gas Coolers—Surface and Spray Type • Jenssen Pressure Acid Systems • Jenssen Auxiliary Process Towers • Recovery Plants—Cooking Acid

SOLUBLE BASE ACID PLANTS
SEMI CHEMICAL PLANTS
JENSSEN SO_2 ABSORPTION SYSTEMS
FOR BLEACH PLANT APPLICATION
SULPHUROUS ACID PREPARATION

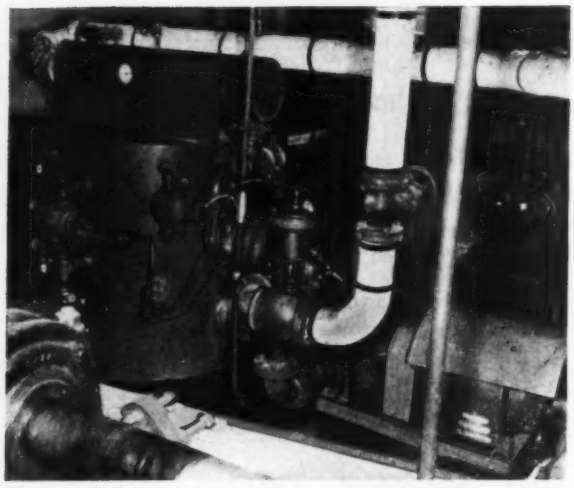
G. D. JENSSEN CO., INC.
WATERTOWN, NEW YORK
WESTERN REPRESENTATIVE:
JAMES BRINKLEY COMPANY, Seattle, Washington
FOUNDED 1915

ENGLISH ECCO CLAYS TRADE MARK CLAYS

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

Fitchburg Mill saves 4 ways with Stickle vacuum pump



One mill in the Fitchburg area reports these four savings since installation of the Stickle vacuum pump shown above:

1. Higher efficiency—The Stickle vacuum pump keeps dryers free of condensate and air, returns condensate to boiler room at higher temperature.
2. Fewer failures—The Stickle vacuum pump is designed for continuous operation where exterior temperatures and humidity are extremely high.
3. Lower cost—The Stickle vacuum pump shortens heat-up period. Built-in heat exchanger eliminates costly cooling equipment and need for adding raw water to condensate return. Use of standard pumps and motors makes replacement easy, inexpensive.
4. Greater flexibility—The Stickle vacuum pump permits 25% pump capacity increase at small cost. Drying pressure changes may be handled automatically.

The Stickle vacuum pump is designed for vacuums up to 28". Single and Duplex models—each in ten sizes. Duplex unit has duplicate pumps, motors, controls. Capacities for Single unit up to: 150 GPM (water) and 145 CFM (air); or 450 GPM (water only). For Duplex unit, these capacities are doubled. Write for Bulletin No. 260. It's free.

Stickle Steam Specialties Company
2215 Valley Avenue • Indianapolis 18, Indiana

MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are OPS ceiling prices, cents per pound, delivered mills:

	per cwt.
Blue Overalls	14.50
Corduroy	8.00
Washables, No. 1	6.50
Percales	12.50
Light Prints, No. 1	11.50
Khaki Cuttings—	
Sun Tan	11.50
Mixed	8.00
New White Canvas	19.00
Canton Flannels, bleached	21.00
Canton Flannels, unbleached	21.00
Shirt Cuttings—	
New White No. 1	21.00
Silesias No. 1	16.00
New Unbleached	21.00
Fancy	10.00
Linen Cuttings—	
American	14.50
White	21.00
Grey	21.00

Current quotations to mills, f.o.b. New York:

Blue Overalls	9.75 to 10.25
Washables, No. 1	4.25 to 4.50
Light prints, No. 1	8.00 to 8.50
Khaki Cuttings, Mixed	4.75 to 5.00
Canton Flannels, Bleached	14.00 to 14.50
Canton Flannels, Unbleached	14.00 to 14.50
White Shirt Cuttings, No. 1	14.50 to 15.00
Silesias, No. 1	11.50 to 12.00
New Unbleached Muslins	16.00 to 16.50
Fancy Shirt Cuttings	7.25 to 7.75
American Linen Cuttings	12.00 to 12.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	1.25 to 1.35
No. 2	.95 to 1.05
No. 3 and 4	.80 to .90
Twos and Blues—	
Repacked	2.50 to 2.75
Thirds and Blues—	
Repacked	2.25 to 2.50
Miscellaneous	1.75 to 2.00
Whites, No. 1—	
Repacked	5.75 to 6.25
Miscellaneous	5.00 to 5.25
White, No. 2—	
Repacked	4.75 to 5.00
Miscellaneous	4.00 to 4.25

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.50 to 5.75
Domestic	5.25 to 5.50
Wool Tares—	
Light	6.00 to 6.25
Heavy	6.25 to 6.50
No. 1 Scrap Bagging	4.75 to 5.00
Manila Rope—	
No. 1 large	6.75 to 7.00
No. 1 small	5.75 to 6.00
Sisal Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.50 to 5.75
New Burlap Cuttings	6.50 to 7.00
Jute Threads—	
Foreign (Nom.)	6.75 to 7.25
Domestic	6.75 to 7.25
Strings—	
No. 1 sisal	5.75 to 6.00
No. 2 sisal	5.25 to 5.50
Soft jute	5.50 to 5.75
Mixed	3.25 to 3.50

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts	115.00 to 120.00
Hard White No. 1	80.00 to 85.00
Soft White, one-cut	75.00 to 80.00
Soft White, No. 1	65.00 to 70.00
Soft White, Misc.	40.00 to 45.00
Fly Leaf No. 1	25.00 to 30.00
Fly Leaf, Woody No. 1	25.00 to 30.00
No. 2 Mixed Col. Woody	20.00 to 25.00
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	20.00 to 22.00
Mixed Books	14.00 to 15.00
Ledger Stock—	
No. 1 White	55.00 to 60.00
No. 1 Mixed (Colored)	35.00 to 40.00
Manilas—	
New Env. Cuttings	60.00 to 65.00
New Env. Cuts, One-Cut	—
Extra Manilas	22.50 to 25.00
Manila Tab Cards, Free of Ground Wood	65.00 to 70.00
Colored Tab Cards	45.00 to 50.00
Kraft—	
New Envelope Cuttings	60.00 to 65.00
Tripled Sorted No. 1 100%	40.00 to 45.00
No. 1 Old Assorted	27.50 to 30.00
News—	
White Blank	65.00 to 70.00
Overissue	24.00—
No. 1 Folded	18.00—
Old Corrugated Containers	20.00—
New Jute Corrugated Cuts	26.00—
Mill Wrappers	13.00—
Box Board Chips	11.00—
No. 1 Mixed Paper	10.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.55—
Ground, cwt.	4.30—
Powdered, cwt.	4.70—
Blanc Fixe—	
Pulp, bulk, ton	90.00—
Dry, barrels	95.00—
Bleaching Powder—	
Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	28.00—
Argentine, lb.	18.00—
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	17.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tanks cars (wks) cwt.	2.70—
Gelatine (silicin), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	34.00 to 34.50
Litharge, powd. bbl. lb.	.16½ to .17½

MARKET QUOTATIONS

Rosin (Gum)—	New York, per 100 lbs.
E	8.40—
F	8.40—
G	8.40—
WW	8.80—

Rosin (Wood), carlots, F.O.B. South	4.35 to 4.50

Salt Cake—	
Dom. bulk (wks) ton	17.00 to 23.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	22.00—

Soda Ash—	
Bulk (works) cwt.	1.30—
Paper bags, cwt.	1.50—

Soda (Caustic)—	
Solid drums, cwt.	3.35 to 3.40
Ground and flake, drums, cwt.	3.75 to 3.85

Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.	1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt.	1.30 to 1.40

Starch—	
Pearl, 140 lb. bags, cwt.	6.39—
Pearl, barrels, cwt.	6.39—
Paper (Sp.) bags, cwt.	6.39—
Powdered, barrels, cwt.	6.60—

Sulphur (Crude)	
(Mine) bulk, long ton	21.00 to 22.00

Talc—	
Dom. 100 lb. bags (mine) ton	25.00 to 28.00
Canadian	35.00 to 45.00

Titanium Dioxide—	
Barium Pig, bbls., lb.	.21 to .21½
Calcium Pig, bbls., lb.	.21 to .21½
Zinc Sulphide, bbls., lb.	11.50 to 11.75

WOOD PULP

The following are OPS ceiling prices on domestic wood pulp, dollars per short air dry ton delivered consuming mills including the basic maximum freight allowances as provided:

Bleached sulphite	140.00—
Unbleached sulphite	132.50—
Bleached sulphate	145.00—
Semi-bleached sulphate	140.00—
Unbleached sulphate	132.50—
Bleached soda	140.00—
Ground wood	92.50—
Sulphite screenings	72.50—
Sulphate screenings	67.50—
Ground wood screenings	60.00—
Unbleached sulphate siderurs	132.50—
Standard news print siderun	92.50—

OPS ceiling prices on European wood pulp, dollars per short air dry ton, on dock at American Atlantic ports, follow:

Bleached sulphite	225.00—
Bleached sulphate	230.00—
Unbleached sulphite	200.00—
Unbleached sulphate	200.00—

Current quotations on imported wood pulp, dollars per short air dry ton, on dock American Atlantic ports with varying inland freight allowances follow:

Bleach. sulphite, Canadian	145.00—
Bleach. sulphite, Swedish	140.00—
Bleach. sulphite, Norwegian	140.00—
Bleach. sulphite, Finnish	140.00—
Unbl. sulphite, Canadian	130.00—
Unbl. sulphite, Swedish	115.00—
Unbl. sulphite, Finnish	120.00 to 125.00
Bich. kraft, Canadian	145.00 to 150.00
Bich. kraft, Swedish	142.50—
Unbl. kraft, Canadian	100.00 to 125.00
Unbl. kraft, Swedish	100.00—
Unbl. kraft, Finnish	105.00—

PAPER

Boards—
OPS ceiling prices (CPR 108) per ton, delivered consumer's mill, 10 tons or more:

Plain chip	90.00—
News vat lined chip	92.50—
Filled news	90.00—
Solid news	92.50—
White vat lined chip	132.50—
Chip tube and can stock	100.00—
Single manila lined chip	137.50—
Single jute lined chip	135.00—
White patent coated:	
.020	160.00—
.018	162.50—
.016	165.00—

Book Paper—
OPS ceiling prices (CPR 106) per cwt.:

Coated two sides

70 lb. No. 2 enamel, 25x38-500, trimmed 4 sides	4 cases	$17.25
	Carloads	$16.30
45 lb. enamel, 25x38-500, trimmed 4 sides	4 cases	$13.05
	Carloads	$12.10

Uncoated

55 lb. No. 2 offset, 25x38-500, trimmed 4 sides	4 cases	$14.80
	Carloads	$13.85
50 lb. A Grade English Finish, 25x38-500, untrimmed	4 cases	$14.05
	Carloads	$13.10
20 lb. envelope, 17x22-500, untrimmed	Carloads	$12.40
16 lb. tablet, 17x22-500	Carloads	$11.35

Rag Content Bond—
OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

	17 lbs. or heavier	16 lbs.
Extra 100% rag	57.50	58.50
100% rag	49.50	50.50
75% rag	38.00	39.00
50% rag	29.50	30.50
25% rag	24.00	25.00

Rag Content Ledger—
OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

Extra 100% rag	58.50
100% rag	50.50
85% rag	42.00
75% rag	39.50
50% rag	30.50
25% rag	25.00

Sulphite Bond—
OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

	17 lbs. or heavier	16 lbs.
Air dry bond (Watermarked)	20.00	21.00
No. 1 bond (M.F. watermarked)	15.50	16.20
No. 2 bond (M.F. watermarked)	14.90	15.60
Plain bond (M.F. unwatermarked)	14.00	14.60

Sulphite Ledger—
OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

No. 1, M.F. watermarked	16.50
No. 2, M.F. watermarked	15.90
Plain, M.F. unwatermarked	15.00

Glassine (f.o.b. mill)—
OPS base ceilings (CPR 76): per cwt.

25 lb. base No. 1 bleached glassine	22.50—
25 lb. base No. 1 bleached greaseproof	20.00—

News— per ton

Rolls, Standard (Contract)	123.00 to 126.00
Rolls (Spot)	(Nominal)
Sheets	138.00—

Tissues (Carlots)— per ream

White No. 1	1.85—
White No. 2	1.35—
Bleached Anti-Tarnish	2.20—
Colored	2.00—
Anti-Tarnish Kraft	1.75—
Manila	2.00—
Napkins, semi-crepe (12¼ lb. to M shts.) per cs.	.90—
Napkins, full crepe and embossed (12¼ lb. to M shts.) per cs.	.90—
Toilet, Bleached (M shts.) per cs.	10.00—
Toilet, Unbleached (M shts.) per cs.	8.00—

Towels per case

Bleached	3.80—
Unbleached	5.90—

Wrappings (Kraft)—
OPS ceilings, per cwt., 50 lb. base weight: per cwt.

Standard wrapping	7.75—
Butchers, counter rolls	8.25—
Standard bag, mill rolls	7.50—
Shipping sack, mill rolls	7.75—
Gumming, mill rolls	8.00—
Asphalting, mill rolls	7.75—
Envelope, mill rolls	9.25—

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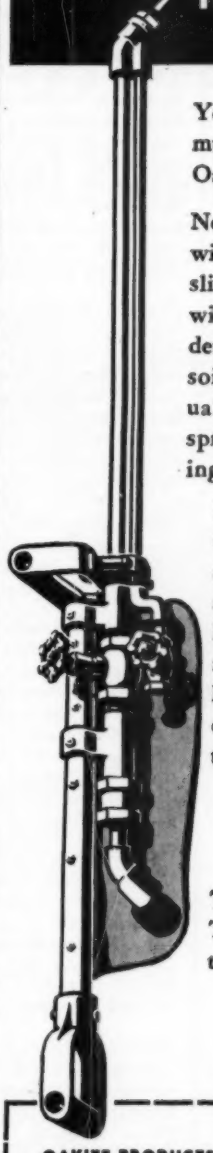
equipment clean
in half the time



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No brushing, scraping, scrubbing with this dirt-dynamiter. Gun hits slime, grease, sizing, pitch, etc., with heat, force, powerful Oakite detergent. Breaks up, floats off all soils, even from places where manual cleaning can't reach. Lifts spray up to 12 feet above working level.

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- Save-alls
- Dandy rolls

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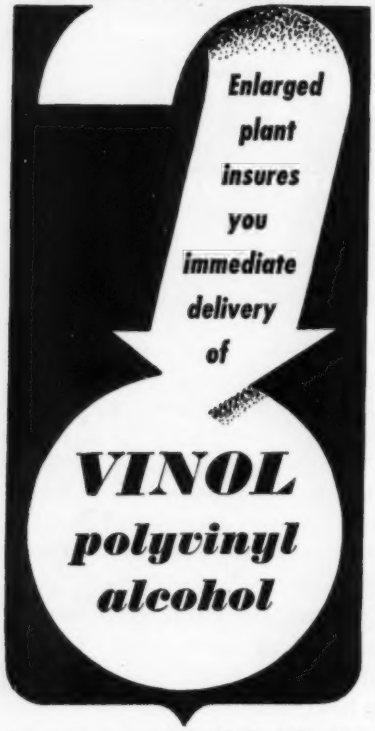

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VINOL Polyvinyl Alcohol is extensively used in the Adhesive, Textile, Paper and Packaging Industries. VINOL is non-gelling, white, free-flowing, fast-dissolving and uniform.

SPECIFICATIONS

VINOL Polyvinyl Alcohol is available in two grades:

	FH-400 (medium grade, fully hydrolyzed)	FH-500 (high viscosity, fully hydrolyzed)
Hydrolysis	98.5—100%	98.5—100%
Insolubles (in water)	1.0% max.	1.0% max.
Volatiles	5.0% max.	5.0% max.
Ash	2.0% max.	2.0% max.
pH	6 - 8	6 - 8
Viscosity (4% in water)	20 - 30 cps	35 - 50 cps
Gel characteristics	Non-Gel	Non-Gel
Color	White	White

THE MARK OF CCC QUALITY

For samples and information, write Dept. 43

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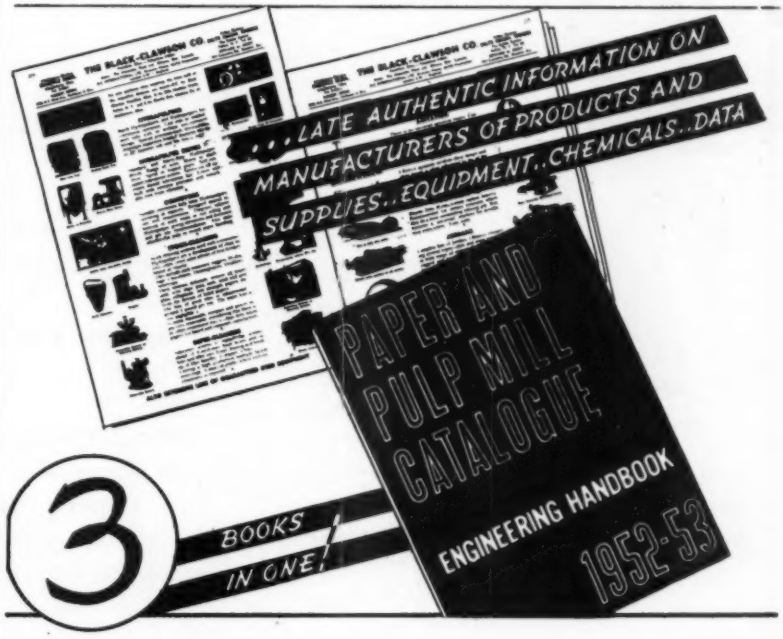
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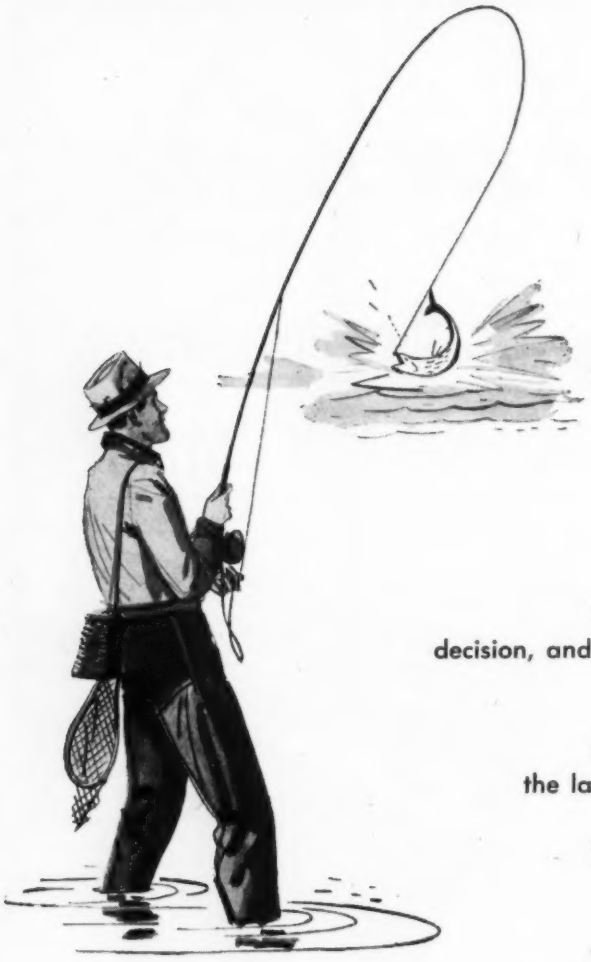

TENAX FISHING AWARDS FOR 1952

The entries are all in, the Judges have made their decision, and the prizes have been sent to the skillful fishermen who were the winners.

Over 200 entries were received and since only the largest were sent in, this is some kind of a record.

The winners were 16 First Prize, 15 Second Prize, 11 Third Prize.

THE NATIONAL GRAND PRIZE, a 10 h.p. Johnson Outboard Motor, was won by Harry W. Bare, Sinking Spring, Pennsylvania, an employee of the Acme Paper Board Division, Federal Paper Board Company, Reading, Pennsylvania. His entry, a 16½ pound Large Mouth Bass.

The all-time world record for this species is 22 pounds, so Mr. Bare is to be congratulated for his outstanding feat.

Every person who entered a fish in this contest will receive a Tenax Fishing Contest Award pin to show he is a member of this exclusive group. In the near future Lockport Felt will issue a brochure of this year's contest in detail. All of the winners and their catches will be listed. Also details of the 1953 Tenax Fishing Contest.

Here's to Bigger Fish in 1953.

LOCKPORT FELT COMPANY

SOLE MAKERS OF TENAX PAPER MAKERS FELTS • NEWFANE, N. Y.

ROTARY UNION

THE ROTARY STEAM CONNECTION

...Especially Designed for Paper Mills

There are 40 standard types and sizes of ROTARY UNIONS. This Type "FSG" was designed *especially* for the high speeds, pressures and temperatures, and continuous heavy duty service required on paper mill dryers, calenders, digesters, etc.

This Type "FSG" ROTARY UNION is flanged directly to the journal and revolves with the drum itself, thus taking the strain from sealing parts. Many have been in service for three years or more *without requiring mechanical maintenance of any kind* . . . cutting maintenance labor and down-time to the bone. Its special heavy duty, metal-backed graphite bearing requires no lubrication and permits continuous high speeds under high pressures and temperatures. A two point syphon support takes excessive strain from syphon pipe threads and prevents wearing through and falling off of syphon pipes.

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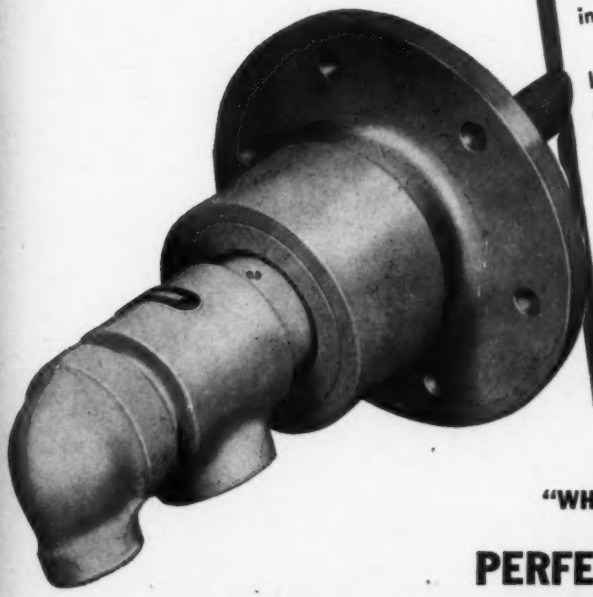

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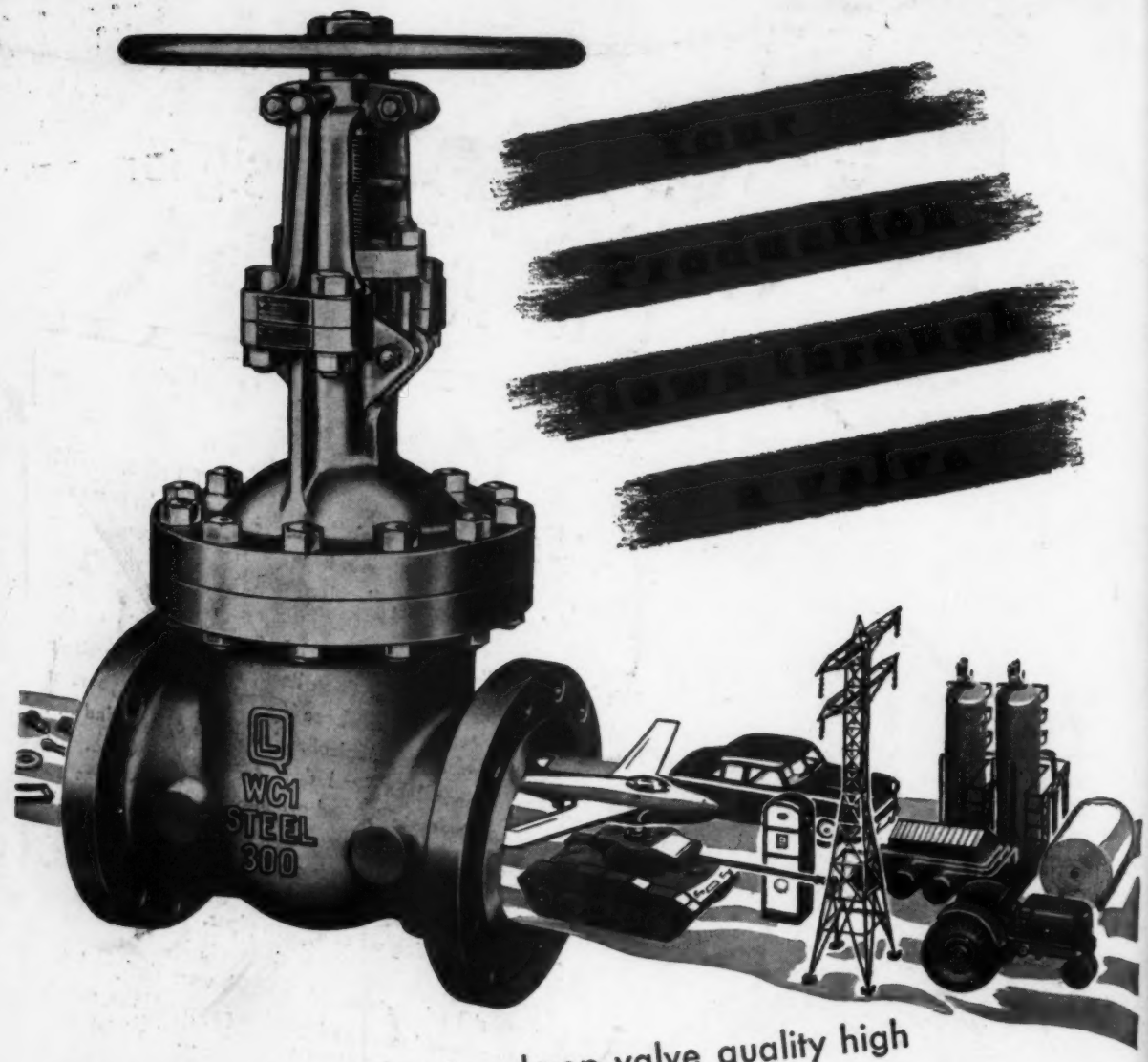

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FIG. 123

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(Non-Metallic-Disc)

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Industry's faith in Lunkenheimer Valves is based on nearly a hundred years of experience with Lunkenheimer design, materials, and workmanship.

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